BUREAU OF FISHERIES

REPORT OF
THE COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1905
AND
SPECIAL PAPERS

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Commissioner

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REPORT OF THE COMMISSIONER OF FISHERIES FOR THE FISCAL YEAR ENDED JUNE 30, 1905

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REPORT

OF THE

COMMISSIONER OF FISHERIES

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FISCAL YEAR ENDED JUNE 30, 1905.

DEPARTMENT OF COMMERCE AND LABOR,
BUREAU OF FISHERIES,
Washington, December 1, 1905.

SIR: I have the honor to submit a report of the operations of the Bureau of Fisheries during the fiscal year ended June 30, 1905. The scope and progress of the work are presented in a review of the respective branches—namely, the propagation and distribution of food fishes, scientific investigation of subjects relating to aquatic life and the development of aquatic resources, and the collection of statistics and other information concerning the fisheries.

PROPAGATION AND DISTRIBUTION OF FOOD FISHES.

GENERAL DISCUSSION OF THE YEAR'S WORK.

It is gratifying to be able to record another very successful season in fish-culture. While the artificial propagation of some valuable food fishes was on a smaller scale than usual, the general results as gaged by the output of the hatcheries were considerably greater than those of any previous season.

Marked progress has been made in the appliances and methods employed in several branches of the work, leading to increased efficiency, larger output, and diminished expense. Some of the newly perfected methods of handling eggs and fry mark a distinct epoch in American fish-culture and suggest that still more important discoveries may be expected.

The popularity of the government's efforts to maintain the supply of native fishes and to stock barren or depleted waters is yearly increasing. By delivering fish at the nearest railway station free of charge to applicants, and rendering assistance in various other ways, the Bureau encourages the utilization of private and intrastate waters, and during the year has supplied nearly 5,000 such applicants. The great

commercial fishes are for the most part planted by the Bureau's employees directly in public waters.

Conditions affecting important branches of the work in certain states are such as to occasion solicitude for the welfare of the fisheries because of the failure of the states to appreciate the necessity of insuring the survival of a certain proportion of the run of fish until the eggs are deposited naturally or taken by the fish-culturist. The intelligent adaptation of artificial propagation to particular fisheries will insure the perpetuation of the species and permit the greatest freedom in the fishery, but artificial propagation unaided can not maintain fisheries that are conducted with such vigor and energy that the percentage of fish which reach the spawning grounds is each year growing smaller. The Bureau can not contemplate without concern the trend of the shad fisheries of Chesapeake Bay, the salmon fisheries of Oregon, Washington, and Alaska, and the whitefish fisheries of the Great Lakes, and believes that the situation demands the prompt attention of the various states concerned. The failure of these important fisheries may not be imminent, but that it is certain, if the present conditions are permitted to continue, no unbiased and well-informed person can doubt.

The regular fish-cultural work of the Bureau is now addressed to about fifty different species, while a number of others are handled from time to time, and new fishes are yearly added to the list of those cultivated. The list includes the principal food and game fishes in all parts of the country, and so comprehensive have the operations become that few economically important fishes of the lakes and streams are now neglected. The salmon and bass families have the largest number of species among those handled, but twelve other families also are represented.

Among the species propagated in larger numbers than in any previous year are the Pacific salmons, the lake trout, the cisco or lake herring, the pike perch, the yellow perch, the large-mouth black bass, the pollock, and the lobster. The output of whitefish, cod, and the smaller trouts was of average size; and the shad was the only important fish of which the yield was much smaller than usual.

The operations of the salmon-hatching stations on the tributaries of the Sacramento River, California, were more extensive than ever before, and the take of eggs could have been considerably increased had there been facilities for handling it. The season closed with over 103,000,000 eggs (about 7,000 gallons) in the hatcheries. In marked contrast with this work was that on the Columbia River and its tributaries, where the egg collections amounted to only 30 per cent of those of the previous year, notwithstanding that the work was most actively pushed and several new field stations were established. The unfavorable outcome is attributed to the action of the state authorities in permitting

unrestricted fishing during the closed season, the salmon having no protection whatever during their run to the spawning grounds.

An almost unprecedently small run of shad in the tributaries of Chesapeake Bay and in other waters where the Bureau has hatcheries resulted in one of the poorest seasons in the history of shad culture. The spring was unusually favorable for all kinds of net fishing in the bays and estuaries, and consequently a very large proportion of the run was caught before the fish reached the spawning grounds. It is reported that the catch of shad in the Potomac River in 1905 was the smallest ever known. Unless the number of shad nets that may be set in and below the mouths of streams is limited and the survival of a fair proportion of the spawning fish is insured, the efforts of the Bureau to maintain this important fishery may not be successful.

The completion of the hatchery on the Maine coast was promptly followed by extensive operations, and the outlook for effective marine culture in that state is unusually bright. The principal purpose of the hatchery is the propagation of lobsters, and the first season's record fully justifies its establishment. From impounded lobsters and from lobsters purchased from the fishermen more than 80,000,000 eggs have been taken. As an adjunct of lobster cultivation, this station has been equipped for cod hatching, the field for which appears to be extensive and promising, and the first year's output—nearly 50,000,000 vigorous fry—is gratifying.

In connection with the carp, the distribution of which was discontinued many years ago, it may be noted that the Bureau receives daily applications for this fish for planting in public and private waters, and it is quite evident that among a large proportion of the population this species is regarded with favor for stocking certain kinds of waters.

STATIONS OPERATED.

In the past year fish-cultural operations were conducted at 55 stations and substations, located in 29 states and territories. On the northeast coast cod, pollock, flatfish, and lobsters were propagated at 3 stations; on the rivers of the Atlantic seaboard salmon, shad, striped bass, white perch, and yellow perch were hatched at 8 stations; on the Great Lakes the eggs of whitefish, lake herring, lake trout, and pike perch were incubated at 7 stations; on the Pacific coast rivers the various salmons received attention at 11 stations; and on the interior waters landlocked salmon, rainbow trout, black-spotted trout, brook trout, grayling, black bass, crappie, sunfish, etc., were handled at 25 stations.

The field of operations in all branches of this work was wider than in former years, owing to the establishment of numerous egg-collecting stations in conjunction with the regular hatcheries. On the New England coast there were 11 such stations; on the Great Lakes, 22; on the Pacific salmon streams, 4; and on the interior waters, 17.

SUMMARY OF THE DISTRIBUTIONS.

The output of the hatcheries in 1905 was larger than in any previous year, aggregating 1,759,475,000, of which upward of 410,480,000 represented fertilized eggs, 1,337,371,000 fry, and 11,623,700 fingerlings, yearlings, and adults. As will be seen from the following table, the output of each of two species exceeded 300,000,000, and that of each of six others was more than 100,000,000.

Distribution of fish and eggs during the fiscal year 1905.

Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Catfish			427,425	427,425
Buffalo-fish			214,000	214,000
Shad	378,000	32,859,000		33,237,000
Whitefish	60,963,000	268,405,000		329,368,000
Bluefin whitefish	380,000	1,000,000		1,380,000
Lake herring	87,040,000	35,000,000		122,040,000
Chinook salmon	96,055,775	21,620,288	5,125	117,681,188
Silver salmon	107,000	10,633,900		10,740,900
Blueback salmon		7,819,281	10,000	7,829,281
Steelhead trout	139,400	635,905	51,638	826,943
Rainbow trout	286,000	442,160	345,204	1,073,364
Atlantic salmon	8,000	727,462	289,188	1,024,650
Landlocked salmon	192,000	275,004	130,477	597,481
Black-spotted trout	305,000	41,205	6,388,031	6,734,236
Scotch sea trout			3,479	3,479
Loch Leven trout		27,000	2,062	29,062
Lake trout	5,320,000	35,993,266	11,469	41,324,735
Brook trout	456,000	8,933,881	1,083,454	10,473,335
Golden trout		157,490	269	157,759
Grayling	400,000	450,000	20	850,020
Pike			62,200	62,200
Crappie and strawberry bass			859,592	859,592
Rock bass			58,099	58,099
Warmouth bass			2,200	2,200
Small-mouth black bass			191,665	191,665
Large-mouth black bass			713,111	713,111
Bream or sunfish			447,908	447,908
Pike perch	152,750,000	246,148,775	395	398,899,170
Yellow perch	5,000,000	139,452,521	326,715	144,779,236
Striped bass		2,463,000		2,463,000
White perch	700,000	23,700,000		24,400,000
Tautog		2,983,000		2,983,000
Cod		169,577,000		169,577,000
Pollock		8,456,000		8,456,000
Flatfish		203,356,000		203,356,000
Lobster		116,214,000		116,214,000
Total	410,480,175	1,337,371,138	11,623,726	1,759,475,039

TRANSPORTATION OF THE HATCHERY OUTPUT.

In distributing the product of the hatcheries to all parts of the country six special cars are employed. These cars are provided with small permanent crews, are equipped with all necessary apparatus for the safe carriage of young and adult fishes, and are attached to passenger trains. Many of the railroads, appreciating the benefits arising from the stocking of waters along their lines, render this service gratis; others collect regular fares for cars and men. When plants of fish are made off the main lines they are carried in baggage cars in charge of detached messengers of the car service. During the fiscal year 1905 the cars of the Bureau were drawn 82,794 miles and the

detached messengers traveled 297,950 miles, of which 14,262 miles and 113,701 miles, respectively, were free. The amount of the railroad transportation required is a fair index of the activity and growth of the fish-cultural work, and it will be noted that in 1905 the increase over 1904 was 26 per cent in mileage of cars and 188 per cent in mileage of messengers.

DISTRIBUTION IN THE VARIOUS STATES.

The work of the Bureau in increasing the fish supply now extends to every state and territory except Alaska, and will include that territory in the fiscal year 1906. The extent to which the various states were recipients in the distribution of food and game fishes is here shown. Owing chiefly to the existence of local hatcheries and to the extent of the local fisheries, California, Maine, Maryland, Massachusetts, Michigan, New York, Ohio, Pennsylvania, Vermont, and Virginia have received the largest number of fish, although it must be borne in mind that fish deposited in the Great Lakes and interstate waters may benefit other states quite as much as those in which the plants are originally made.

Distribution of fish and eggs in states and territories in 1905.

State or territory.	Number of fish and eggs.	State or territory.	Number of fish and eggs.
Alabama	68,797	Nebraska	15,137,765
Arizona	6,550	Nevada	7,000
Arkansas	56,077	New Hampshire	1,006,655
California	103,297,155	New Jersey	3,511,300
Colorado	6,423,040	New Mexico	125,650
Connecticut	5,132,643	New York	42,486,700
Delaware	2,350	North Carolina	5,557,698
District of Columbia	838,200	North Dakota	54,903
Florida	3,500	Ohio	362,365,783
Georgia	43,003	Oklahoma	12,100
Idaho	125,050	Oregon	11,951,147
Illinois	719,240	Pennsylvania	147,549,145
Indiana	1,855,968	Rhode Island	201,200
Indian Territory	15,328	South Carolina	74,046
Iowa	1,485,114	South Dakota	2,079,100
Kansas	35,525	Tennessee	92,651
Kentucky	34,990	Texas	129,448
Louisiana	6,713	Utah	818,975
Maine	137,480,577	Vermont	64,908,206
Maryland	159,808,401	Virginia	28,810,699
Massachusetts	370,763,637	Washington	20,195,149
Michigan	222,978,059	West Virginia	424,930
Minnesota	9,825,745	Wisconsin	15,348,731
Mississippi	44,996	Wyoming	720,550
Missouri	10,754,547		
Montana	2,044,300	Total	1,757,419,039

RELATIONS WITH THE STATES.

The usual friendly relations and mutually beneficial cooperation between the Bureau and the fishery authorities of the various states have been maintained. One line of policy that has been adopted, which will minimize the possibility of injury as a result of the introduction of nonindigenous fishes into given waters, is that the Bureau

refers to the proper state officers for approval or rejection most applications for fish that are not native to the respective states. The necessity for this course has arisen from the receipt of numerous requests for predaceous or destructive fishes for the stocking of waters in which weaker species exist. An instance of this is the effort of residents of the Pacific States to introduce black bass into trout streams and lakes, or into waters tributary to salmon streams.

The Bureau has allotted to the state fish commissions the usual large number of eggs, which are hatched under state auspices and the resulting fry deposited in state or public waters. The donations of eggs and fish in 1905, as shown in the following table, aggregated over 400,000,000 and reached twenty-one states.

Allotments of eggs and fish to state fish commissions in 1905.

State and species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
California:			
Chinook salmon	95,585,775		
Grayling	150,000		
Colorado:			
Black-spotted trout	75,000		
Connecticut:			
Shad		1,239,000	
Landlocked salmon	10,000		
Lake trout	200,000		
Delaware:			
Rainbow trout			1,000
Kansas:			
Crappie			75
Large-mouth black bass			200
Maine:			
Silver salmon	55,000		
Landlocked salmon	50,000		
Maryland:			
Shad		4,998,000	
Rainbow trout	38,000		
Yellow perch	5,000,000		
Massachusetts:			
Landlocked salmon	20,000		
Brook trout	100,000		
Pike perch	5,000,000		
Michigan:			
Landlocked salmon	10,000		
Lake trout	2,436,000		
Grayling	100,000		
Pike perch	52,400,000		
Missouri:			
Brook trout	100,000		
Pike perch	10,000,000		
Nebraska:			
Rainbow trout	41,000		10,000
Brook trout			4,000
Pike perch	15,000,000		
New Hampshire:			
Silver salmon	50,000		
Landlocked salmon	10,000		
Lake trout	250,000		
New Jersey:			
Shad		3,256,000	
New York:			
Lake trout	500,000		
Whitefish	3,000,000		
Brook trout		260,540	
Pike perch	5,000,000		
Ohio:			
Whitefish	4,144,000		
Lake herring	50,000,000		
Oregon:			
Lake trout		8,000	
Pennsylvania:			
Shad	378,000	70,000	

Allotments of eggs and fish to state fish commissions in 1905—Continued.

State and species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Pennsylvania—Continued.			
Whitefish	42,809,000		
Lake herring	37,040,000		
Rainbow trout	30,000		
Atlantic salmon	5,000		
Lake trout	1,000,000		
Brook trout			4,000
Pike perch	63,350,000		
Yellow perch		225,000	
Rhode Island:			
Small-mouth black bass			400
Large-mouth black bass			800
Utah:			
Lake trout	100,000		
Brook trout	100,000		
Grayling	50,000		
Vermont:			
Lake trout	500,000		
Wyoming:			
Steelhead trout	25,000		
Lake trout	50,000		
Grayling	50,000		
Total	394,811,775	10,056,540	20,475

In the work on the Great Lakes large numbers of whitefish, lake trout, and pike perch eggs have been assigned to the Pennsylvania, Ohio, and Michigan fish commissions, the resulting fry being very largely deposited in the Great Lakes. Pennsylvania and Ohio bear a part of the expense of collecting whitefish and pike perch eggs in Lake Erie. The yield of salmon eggs in California has been so large that the Bureau's hatcheries could not accommodate them, and, as heretofore, a very considerable part of the take has been transferred to the hatchery of the state fish commission.

The Bureau has operated the hatchery of the Oregon fish commission on the upper Clackamas River; the hatcheries of the Michigan fish commission at Detroit and Sault Ste. Marie, the latter in conjunction with the state commission; and the hatchery of the Pennsylvania fish commission at Torresdale, on the Delaware River.

The Massachusetts fish commission tendered the use of its launch for making collections of egg-bearing lobsters from outlying points between Boston and Beverly; the Maine fish commission extended a similar courtesy; and the New Jersey fish commission placed at the Bureau's disposal a launch for use in the shad-hatching work on the Delaware River.

On April 8, 1905, an important conference was held at Chicago between representatives of the various states bordering on the Great Lakes, for the purpose of promoting the interests of the fisheries in those waters. The meeting was largely attended by fish commissioners, members of the fishery committees of state legislatures, fish wardens, superintendents of hatcheries, and others. The Bureau was

invited to participate, and designated the superintendents of its stations in Michigan and Illinois to represent it. Among the resolutions adopted by the conference was one recommending to the state legislatures the enactment of a law authorizing the Bureau of Fisheries to collect fish spawn during the closed seasons; another providing for the licensing by the states of both commercial and rod fishermen; another recommending to the state legislatures the enactment of uniform protective fishery legislation, as formulated by a special joint committee of the conference; and the following, in which this Bureau is particularly interested:

That this convention recommend to the legislatures of the several states represented that they memorialize Congress to take jurisdiction of international and interstate waters for the purpose of propagating and protecting fish in said waters, and that said states express their willingness to cede to the federal government all jurisdiction that rests in said states.

At the invitation of the governor of Michigan the Commissioner visited that state in April, 1905, for a conference relative to the Bureau's work in the Michigan waters of the Great Lakes. The superintendent of the Michigan stations accompanied the Commissioner, and the state was represented by the governor, the president of the state board of fish commissioners, and the state fish and game warden. The subject of the conference was the interference of the fish and game warden with the Bureau's fish-cultural operations, as noted in the last annual report. The outcome of the meeting was very satisfactory, and steps were taken to insure a continuance of the government's work without molestation. A bill that was drafted at the conference was shortly thereafter introduced in the Michigan legislature and became a law in May. The full text of the act is as follows:

AN ACT to provide for the gathering of spawn in the Great Lakes bordering upon this State by the United States Bureau of Fisheries, and to provide a penalty for the unauthorized use or imitation of ensigns and markers used by the United States Bureau of Fisheries in taking such spawn; and to repeal section six of act number eighty-eight of the public acts of eighteen hundred ninety-nine.

The people of the State of Michigan enact:

SECTION 1. It shall be lawful for the United States Bureau of Fisheries, through its duly authorized agents, representatives, or employes, to catch fish in any manner and in any of the waters of this State during any and all seasons of the year for the purpose of fish culture and scientific investigations; to have and to hold ripe and unripe fish in order to take spawn therefrom, and to sell all such ripe and unripe fish as are of legal size and devote the proceeds of such sales exclusively towards the defraying of the expenses incurred in catching such fish and the work of collecting and hatching such spawn by the United States Bureau of Fisheries in the State of Michigan: *Provided,* That the State Game and Fish Warden or other proper officer shall be duly notified of the time and place of such fishing: *And provided further,* That at least seventy-five per cent of the fry resulting from the spawn so taken shall be planted in the waters of this State: *And provided further,* That the State Board of Fish Commissioners shall receive an annual report of the operations under this act.

SEC. 2. All boats, buoys, nets, and appliances for catching fish, as herein provided,

shall carry such ensigns and markers as shall distinctly show that they are being used by the United States Bureau of Fisheries. It shall be unlawful to have in possession or use such ensigns and markers or imitations thereof upon any boat, buoy, net, or fishing appliance except when in use by the United States Bureau of Fisheries; and the person or corporation which shall violate this provision shall be deemed to be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than one hundred dollars nor more than five hundred dollars, or by imprisonment in the Detroit house of correction for a period of not more than one year, or by both such fine and imprisonment in the discretion of the court. Any fine imposed upon a corporation under this act may be recovered of said corporation by a suit in the circuit court for the proper county, and any recovery shall carry with it full costs of suit.

Sec. 3. Section six of act number eighty-eight of the public acts of eighteen hundred ninety-nine, being an added section to act number one hundred fifty-one of the public acts of eighteen hundred ninety-seven, entitled "An act to regulate the catching of fish in the waters of this State by the use of pound or trap nets, gill nets, seines, and other apparatus," is hereby repealed.

RELATIONS WITH FOREIGN COUNTRIES.

In response to requests coming through diplomatic channels, the Bureau has furnished eggs of five species of salmonoid fishes to the governments of Argentina and New Zealand, as follows:

Countries.	Species.	Number of eggs.
Argentina	Chinook salmon	100,000
	Rainbow trout	92,000
	Lake trout	224,000
	Landlocked salmon	30,000
New Zealand	Whitefish	1,000,000
	Chinook salmon	300,000
	Landlocked salmon	10,000
Total		1,756,000

In addition to furnishing the foregoing shipments, the Bureau has acted as agent in obtaining 300,000 brook trout eggs for Argentina, 100,000 rainbow trout eggs for an applicant in Germany, and 15,000 rainbow trout eggs for an applicant in France.

Through the courtesy of the fishery authorities of the Province of Ontario, the Bureau has continued to collect whitefish and lake trout eggs in the Canadian waters of Lake Erie and Lake Superior. The immense numbers of whitefish, lake herring, lake trout, pike perch, and other fishes which the Bureau plants in the open waters of the Great Lakes are of almost equal benefit to Canadian and American fishermen. In June, 1905, some 300,000 young lake trout were deposited in the Canadian waters of Lake Superior near Rossport.

RESCUE OF FISHES FROM OVERFLOWED LANDS.

The rescue of fishes from the sloughs formed by the overflow of the Illinois and Mississippi rivers was conducted on a somewhat larger

scale than heretofore. These sloughs in summer either become entirely dry, or, with the high temperature of the water, fill with a rank growth of vegetation which smothers the fish; in winter they freeze. Thus the fish in them must perish unless removed, and the work of the Bureau consists in seining these overflowed places and transferring the fish to suitable waters. Millions of fish have thus been rescued and returned to the rivers; and large numbers are retained for distribution by the car and messenger service to applicants in all parts of the country, these sloughs being one of the chief sources of supply for large-mouth black bass, crappie, and sunfish. The greater proportion of the fish are young, whose presence is accounted for by the fact that the adult fish have found the sloughs satisfactory spawning places and the eggs and young have been left as the water receded. Those destined for distribution are first transferred to stations along the river, where they are retained in tanks and ponds until hardened.

On the Illinois River this work centers at Meredosia, the Illinois state fish commission cooperating with the Bureau to the extent of furnishing a steamer and crew. On the Mississippi River stations for the hardening and distribution of fishes are maintained during the collecting period at Bellevue and North Gregor, Iowa. At the close of the year a third station was in course of construction at La Crosse, Wis. The season's operations on the Illinois River were rather disappointing owing to high water, but on the Mississippi the work was very satisfactory except when interfered with as reported below. The field for work of this character is very extensive, and the operations of the Bureau are limited only by the funds available.

In September, 1904, a crew of employees of the Bellevue, Iowa, station, engaged in rescuing food and game fishes from the overflowed lands adjoining the Mississippi in Jo Daviess County, Ill., were set upon by the sheriff of that county, subjected to many indignities, and imprisoned over night in wet clothes. The alleged ground for this arrest was violation of the state law; as a matter of fact, the Bureau was operating in strict accordance with the law, and this was well known to the sheriff. An Illinois statute provides that—

> * * * it shall be lawful for the Fish Commissioners, or persons authorized by them, to take fish in any way, at any time, and in any such places as they deem best for the purpose of propagation, distribution, or destroying of objectionable fish,

and in pursuance of this authority the state fish commissioners issued a formal written permit to the Bureau's representatives to carry on this work, which has been in progress in that section for many years. After a hearing that had some farcical features the case against the Bureau's agents was not allowed to come to trial, being dismissed by the prosecution.

It has been intimated that the sheriff will make further efforts to stop the fishery work in the county in question, and it will be impor-

tant to have the rights of the Bureau tested before a competent tribunal, as the rescue of millions of fish annually in the interior waters is involved. Jo Daviess County extends from East Dubuque, Ill., to a point about 20 miles below the Bellevue station, a distance of about 35 miles, and comprises a long stretch of low islands, swamps, etc., on which are hundreds of shallow lakes and pools made by the overflow water from the Mississippi River. This is the very best field for the Bureau's work on the upper Mississippi, and on account of this fact the special collecting station was established at Bellevue some years ago. There are not many overflow lakes on the Iowa side of the river within easy reach of the station, and if the Bureau is prevented from taking fish from the Illinois side in Jo Daviess County the work will be seriously crippled in future and will probably have to be abandoned.

ACCLIMATIZATION OF FISH.

Although the results of introducing certain fishes of the eastern seaboard into western waters have been often mentioned in the Bureau's reports, reference should again be made to the increasing abundance of the shad and the striped bass on the Pacific coast. The yearly catch of these fish for market at this time is upward of 4,000,000 pounds, for which the fishermen receive nearly $200,000. The reported aggregate sales of the two species to the end of the calendar year 1904 were 26,400,000 pounds with a value of $955,000 at the prices actually paid to the fishermen.

By way of reciprocity, in past years experiments have been made upon a rather extensive scale to acclimatize the chinook salmon on the Atlantic coast, large numbers of eggs having been transported across the continent, hatched, and distributed in waters deemed suitable for the purpose. No results appear to have followed these efforts, and it is probable that the northeastern rivers are no longer capable of sustaining such a large, vigorous species. It has therefore been determined to attempt the introduction of other west-coast salmons particularly the silver salmon and the humpback salmon.

The excellent steelhead trout of the Pacific coast, introduced into Lake Superior about ten years ago, appears to have become firmly established in the lake and its tributaries, and has now begun to figure in the commercial fisheries. Some eggs have been taken from wild fish and hatched at the Duluth, Minn., station.

Another noteworthy case of acclimatization in Lake Superior is that of the bluefin or blackfin whitefish, introduced from Lake Michigan. This fish has now become exceedingly abundant, and many millions of pounds have been caught and sold by the fishermen. Its eggs are now regularly collected and incubated at the Duluth hatchery.

The value of the Bureau's efforts to increase the supply of game and food fishes in the interior waters has been strikingly illustrated in Colorado, where a number of nonindigenous trouts have been thoroughly established. The principal fish thus introduced is the eastern brook trout, which is widely distributed in the state and probably exists there in greater abundance than in any other state. Colorado has now become the Bureau's chief source of supply for the eggs of this species, and nowhere else is it possible to collect such large quantities of eggs from wild brook trout.

The spotted catfish of the Mississippi basin, which was so successfully planted in the Potomac River a number of years ago, has become more abundant, and is now caught in large numbers by anglers and market fishermen. The fish attains a weight of upward of 20 pounds, and is a general favorite on account of its excellent food and game qualities. In 1905 the fishermen about Washington began to catch another nonindigenous catfish, of which samples were submitted to the Bureau for identification. The fish proved to be the great fork-tailed catfish of the Mississippi, which was doubtless introduced at the same time as the other species, the young of the two being much alike. This fish attains even a larger size than the spotted cat, and examples weighing over 30 pounds have been reported by local fishermen.

An experiment that may prove of some economic importance is the planting of salt-water animals from the Gulf of Mexico in a large natural salt lake at Palestine, Tex. The lake was examined by the superintendent of the San Marcos (Tex.) station, and was found of such a character that an attempt to utilize it in this way was thought to be warranted. Accordingly there were planted in it March 14, 1905, 57 sea mullet, 20 squeteague, 12 redfish, 30 croakers, and 38 silver perch, all adults, together with 24 blue crabs and 1 barrel of oysters.

NEW STATIONS AND IMPROVEMENTS.

At Mammoth Spring, Ark., a topographical survey of the property acquired during the last year was made, maps were prepared showing locations of ponds, pipe lines, buildings, roads, etc., and plans and specifications for the necessary buildings were drawn. Actual construction was begun early in the year and is now well under way. Arrangements are being perfected to begin fish-cultural operations on a limited scale at an early date without waiting for the completion of the station.

At Tupelo, Miss., a building for office and workshop and a barn have been erected. Both these buildings are frame, one and a half stories high, the former 30 feet by 30 feet and suitably divided for the desired purposes, the latter providing accommodations for two horses and necessary vehicles. Pond 6 has been nearly completed, pipe lines

laid, walks and drives built, grounds graded, trees set out, and various other work has been carried on.

The lobster and cod station at Boothbay Harbor, Me., has been completed and propagation work has begun. During the year boilers and pumps and a steam-heating plant were installed, piping run, and hatching apparatus constructed and set up. The hatchery is provided with 14 lobster tables, 16 feet by 3 feet 3 inches, and 12 cod tables of 9 boxes each, the entire floor space, except passageways, being thus occupied. The frame dwelling originally on the premises has been repaired and remodeled into a residence for the superintendent, and an old storehouse has been fitted up as quarters for the men. The grounds have been graded and a stone retaining abutment, 70 feet long, built along the north wall of the hatchery. By January 10 the station was ready to accommodate cod eggs, and by April the lobster equipment was in place and the hatchery fully supplied with the most approved hatching apparatus.

Special appropriations have provided for improvements at several of the older stations. At White Sulphur Springs, W. Va., there have been erected a foreman's cottage, 39 by 37 feet, 1½ stories high, containing 7 rooms; a workshop, 30 by 30 feet, 1 story high, containing suitable rooms; a stable, 30 by 20 feet, arranged for 2 horses and vehicles; and an ice house. These buildings are all frame. Three more large bass ponds and 6 spawning ponds have been constructed, pipe lines laid, grounds graded, and trees set out.

At Green Lake, Me., the improvement of the water supply has been in progress. The dam at Rocky Pond has been rebuilt, lumber obtained for a new flume, and the construction of the latter begun. Seven of the rearing ponds have been repaired, buildings repaired and painted, roads graded, and bridges put in order. No work has yet been undertaken on the proposed new road to the hatchery owing to the difficulty of obtaining a proper title to the land.

At Gloucester, Mass., several much-needed improvements to the buildings and station have been completed. Among the principal of these were the laying of a marine telephone cable from the island to the mainland, and a considerable addition to the pier. A wing to the hatchery, 20 by 30 feet, was erected, and the foundations of the building and those under the boiler and chimney were strengthened. The main hatchery, containing the lobster apparatus, was fitted throughout with galvanized-iron pipe, and by a rearrangement of the tables room was made for 5 additional cod tables, thus increasing the total capacity from 50,000,000 to 65,000,000 cod eggs.

An appropriation of $5,000 provided for the protection of the station at Manchester, Iowa, against floods. Plans and specifications were accordingly prepared for altering, broadening, and deepening the channels of the two streams flowing through the grounds, raising

an old stone retaining wall and constructing new walls along their banks. A 50-foot span iron bridge was also designed in place of a wooden one that had been carried away by a flood. The work was done by contract and satisfactorily completed by May 27, in accordance with the plans, although some consequent grading, etc., is now in progress.

At Northville, Mich., the course of a creek flowing through the station grounds has been widened, and a cement wall 1,310 feet long has been built to prevent damage from overflows. The creek has been straightened also, and the space thus gained has permitted the building of an additional pond of an area equal to the others. The basin of the main supply spring has been excavated and enlarged and its banks strengthened.

At Beaufort, N. C., an iron landing pier was constructed in place of the temporary wooden one, and the east shore of the island on which the laboratory is built was protected from the encroachments of the sea by rock work and two stone jetties. A new coal shed was built, walks laid, and a number of minor improvements made. At the request of the Bureau of Equipment, Navy Department, permission was given for the establishment of a wireless-telegraph station for the Navy, and space on the island has been set aside for the erection of the mast and quarters for the attendants.

At Wytheville, Va., and Leadville, Colo., buildings and ponds were put in good repair, and desirable alterations were made.

ALASKA SALMON HATCHERIES.

The special commission appointed in November, 1902, by direction of the President, to inquire into the needs of the salmon fisheries of Alaska, pointed out (H. Doc. 477, 58th Cong., 2d sess.) the necessity for artificial propagation as a factor in maintaining this important industry. The matter received favorable congressional consideration, and in an act approved March 3, 1905, provision was made for the establishment of one or more salmon hatcheries in Alaska. As the appropriation became available immediately, preparations to carry the law into effect were begun at once.

After a careful consideration of various localities and all interests involved, the special commission recommended that if possible the first hatchery be in readiness for operation during the season of 1905, and that it be built on the lake, now known as McDonald Lake, near the head of Yes Bay, a narrow inlet opening into the west shore of Behm Canal, Cleveland Peninsula, about 20 miles northward from Loring. This site was the best available in southeast Alaska; the location was reported as comparatively easy of access, not far from the main line of travel of regular steamers, and with building mate-

rial at hand, as having a plentiful supply of water obtainable by gravity and an abundance of spawning salmon in the season, and as an exceptionally advantageous center from which to distribute the fry. This recommendation was therefore approved and a site was selected on the right bank of the stream flowing into the head of McDonald Lake, about a quarter of a mile above its mouth. Yes Bay and its catchment basin had been temporarily exempted from settlement November 5, 1903, by an order of the Secretary of the Interior, until such time as a site for a salmon hatchery could be determined upon and a permanent reservation made.

Plans were prepared for a hatchery with a capacity for 25,000,000 eggs, and the construction work was placed in charge of an experienced superintendent in the service of the Bureau, who, having completed preliminary arrangements for materials and supplies, left Seattle for Alaska on June 22. The steamer *Albatross* was also dispatched to Yes Bay, to carry on scientific investigations and at the same time to afford assistance in the establishment of the station.

BIOLOGICAL INVESTIGATIONS AND EXPERIMENTS.

Most of the scientific work during the year was in continuation of inquiries and investigations previously begun, pertaining to the biology and culture of useful and commercially important aquatic animals and plants. Among the most important subjects that have been engaging attention are the oyster, the commercial sponges, the diamond-back terrapin, the Alaska salmon, the habits of the fresh-water and anadromous fishes of New England, the diseases of fishes, the ecology of small glacial lakes, and the extensive studies at the marine biological laboratories of the Bureau. Among the special inquiries taken up during the year may be mentioned a survey of the oyster beds of Matagorda Bay, Texas; a study of the golden trout and other trouts of the southern High Sierras in California; and the life history of the spoonbill catfish. Studies in the hydrography, oceanography, and biology of the eastern Pacific Ocean were conducted during an extended cruise of the steamer *Albatross* in that region.

OYSTER LEGISLATION AND EXPERIMENTS.

Legislation.—The Bureau finds reason for satisfaction in the widespread attention that is now being paid to the subject of oyster culture and the marked advance in the character of oyster legislation enacted by the various states. It is yearly becoming more apparent that dependence upon the natural beds alone to supply the rapidly growing demands of the markets results in the depletion of the beds and a shrinkage of the industry in the locality concerned. Those states that adhere to the old policy of suspicion and restriction toward private

oyster culture are rapidly becoming relatively smaller factors in the business, while others, which have sought to encourage the occupation of barren bottoms by citizens in severalty for purposes of oyster planting, are steadily gaining, with resultant profit to both the state and the citizens.

Owing to divergent conditions the same laws and methods are not strictly applicable to all parts of the coast and in each case the work and recommendations of the Bureau are aimed to supply the local requirements, both as to the means of conservation of the natural beds held by the state as a common possession of the people and the development of oyster culture under private ownership. The investigations of the government have frequently served as the scientific basis for new laws. In 1898 the Bureau published a report on the oyster beds of Louisiana which contained a number of recommendations looking to the improvement of the methods of the oyster industry and the laws controlling it. After protracted agitation, the legislature in 1904 passed a law embodying all of the recommendations, with one minor exception, and ample machinery has been provided for the enforcement of the act, the beneficial effects of which are reported to be already apparent and constantly becoming more marked. A similar result in North Carolina has followed the publication of a report on experiments in oyster culture conducted jointly by this Bureau and the State Natural History Survey. Sufficient time has not yet elapsed to determine the practical effects of the new order; but it can hardly fail to be beneficial. New oyster legislation is now being advocated for Maryland, Virginia, and South Carolina, and the work of the Bureau has been useful in furnishing information and advice.

Investigations in Maine.—Although there is indubitable evidence that oysters at one time occurred on the coast of Maine in considerable numbers, they were practically extinct at the time of the first white settlements except in the Sheepscot River and one or two minor localities. In the Sheepscot there were scattering large oysters with few if any small ones until about 1898, when spat and young were noticed on the timbers of a new dam at Alna. During the following year conditions for breeding and spat production seem to have been favorable, and in July, 1904, the rocks and gravel in the river for several miles above the dam were found to be well covered with an apparently vigorous young growth. With the knowledge of the existence of these volunteer oysters several persons have been encouraged to undertake experiments in oyster culture on a small scale, but though the seed oysters have lived, fattened, and in one case, at least, produced ripe eggs, none of these small artificial deposits has made any progress toward reproducing.

In response to the solicitations of citizens of Maine, an assistant of the Bureau was sent to the state in July, 1904, to determine the

causes of the failure of the oysters to reproduce, and to make investigations preliminary to experiments by the Bureau looking to the establishment of self-perpetuating beds in the coastal waters of the state. During a period of about five weeks 59 localities were examined, covering, in general, the entire coast between Portsmouth, N. H., and Rockland, Me. From the data collected it appears that in many of these localities adult oysters would thrive and fatten, but the density and temperature conditions are such that there would be practically no hope of establishing self-perpetuating beds. In many places the temperature is permanently too low; in others it sometimes reaches the minimum at which spawning takes place (about 68° F.), but the fluctuations due to the flow and ebb of the tides are too violent. In a few places—for example, about the dam at Alna, in the tidal dam at York Harbor, and in Great Bay, New Hampshire—the conditions appear to be favorable both in degree and constancy, and in the same places and for the same reasons the salinity is also apparently satisfactory. The three places named, however, are deficient in food supply, and oysters planted therein would in all probability never fatten to a degree to give them a good place in the markets.

In view of the results of this preliminary work, it appears probable that if oyster culture is introduced on the coast of Maine it will be necessary to subdivide the process, raising the young seed oysters in one locality and growing them for market in another. During the ensuing fiscal year the Bureau contemplates undertaking experiments in breeding oysters in some suitable locality in the state.

Oyster survey of Matagorda Bay, Texas.—Pursuant to a request from the governor of Texas, the Bureau during the past winter and spring made a survey of the oyster beds of that portion of Matagorda Bay lying northeast of Half Moon light, a body of water 39 miles long, with an average width of $1\frac{1}{4}$ miles and an approximate area of 146 square miles. The object of the work was the determination of the character and extent of the natural oyster beds, the locating of the bottom suitable for oyster culture, and the biological and physical features of the bay with special relation to oysters and the oyster industry. The results of the survey will be published in a forthcoming special report, which will contain charts of the oyster grounds and recommendations looking to the further development of the oyster industry of the region.

Experiments at Lynnhaven, Va.—The oyster-fattening experiments at Lynnhaven have been continued, but the illness and death of the local agent, who has had supervision of the work from its inception, has militated against a successful conclusion. As has been stated in previous reports, the same conditions that are desirable in stimulating the growth of diatoms, the oyster's food, are favorable also to the

growth of undesirable unicellular and filamentous algæ, which give to the oyster a disagreeable muddy flavor. The use of copper sulphate for the destruction of such algæ has given satisfactory results.

Oyster and clam experiments in North Carolina.—The oyster-growing experiments in North Carolina conducted in connection with the Beaufort laboratory have been continued. The increasing importance of the quahog, or hard clam (*Venus mercenaria*), in North Carolina, owing to the development of the canning industry, has suggested an inquiry into the habits, growth, and propagation of this species, and in connection with the oyster work experiments in the planting and cultivation of this valuable mollusk have been undertaken.

EXPERIMENTS IN SPONGE CULTURE.

The experiments in the raising of sponges from cuttings at several points on the coast of Florida have been continued, and the results of the year's operations show conclusively that it is possible to raise sponges of merchantable size in this manner, a number of specimens 6 inches in diameter having developed from plants made three years before. The sponges artificially grown are of excellent shape and quality, and are superior in both of these respects to sponges growing naturally in the same localities. The economic aspects of the experiments, however, are still to be demonstrated, as the search for a suitable material for support of the cuttings until they reach commercial maturity is yet unrewarded. Bricks, rocks, and similar bodies on the bottom will undoubtedly serve, but this method, besides having certain mechanical drawbacks, produces sponges inferior in shape and texture to those grown suspended above the bottom. They more nearly resemble the natural sponges, especially in the possession of a "root," which is the raw surface resulting from detachment from the support; it is the "root" that first wears out in use, and the durability of this part determines the wearing qualities of the sponge as a whole. Sponges grown artificially on wires raised above the bottom have a surface uniformly felted and with corresponding uniform wearing qualities.

During May, 1905, there was a considerable mortality among the sponges planted at Anclote Key, affecting principally those in shoal water and near the surface. It seems probable that the condition was due to the prevalence of hot weather with heavy showers, coincident with exceedingly low tides. The extreme sensitiveness of sponges to the influence of rain water has before been noted.

EXPERIMENTAL CULTURE OF DIAMOND-BACK TERRAPIN.

During the summer of 1904 the investigation of the diamond-back terrapin was continued at an experimental pound on the eastern shore

of Chesapeake Bay in Maryland, with a view to devising a method by which terrapins may be hatched and reared for market. In August a few of the impounded terrapin made nests and laid eggs, and the young made their appearance about six weeks later. These furnished material for determining the rate of growth, the effects of different kinds of food, etc. By June, 1905, some of them had increased more than 100 per cent in length and 400 per cent in weight, while others had undergone but slight growth. The stock of adult terrapins was carried through the winter with little loss and with géneral marked improvement in condition.

STUDIES OF PARTICULAR FISHES.

Trout of the southern High Sierras in California.—Early in 1904 the President called the attention of the Commissioner of Fisheries to the golden trout of Volcano Creek and the imminent danger of its extermination. Unusual interest attaches to this species, not only on account of its great beauty, gameness, and delicious flavor, but also because of its very restricted habitat and the scenic beauty of the region in which it is found. Acting on the request of the President, the Bureau made an investigation for the purpose of determining the natural geographic distribution of the golden trout, its habits, food, and spawning time; the streams into which it has been transplanted, and with what results; the other streams into which it may be advantageously introduced; whether its artificial propagation can be undertaken by the Bureau, and what measures should be provided for its protection. Many important facts concerning the golden trout and other trout of the southern High Sierras were learned, all of which will be set forth in a detailed report soon to be published.

The investigations showed that the golden trout is native to but one stream, Volcano Creek, and unless prompt action be taken to provide adequate protection the fish is in serious danger of extermination. It is recommended that the state of California transplant it to a number of barren streams that can be easily reached, and that the general government undertake its artificial propagation. It is further recommended that the limits of Mount Whitney Military Reservation be extended to include Volcano Creek, and that all fishing in that creek be prohibited for a term of three years; that thereafter restrictions be placed on the size and number that may be caught, and that fishing during the spawning season be prohibited.

Physiological studies of the Pacific salmons.—As is well known, the Pacific salmons die after once spawning, a phenomenon which, next to reproduction itself, constitutes the most important fact in the life of these fishes. The causes that lead to this departure from the ordinary course of life of fishes are obscure, and the specific object of these investigations is to determine the physiological changes attending the

passage of the fish from the sea to the fresh waters of the spawning grounds at the river heads, with the belief that light will be thrown on the causes of death. The work so far done has been largely of a preliminary nature, consisting mainly of measurements of a series of fish and their principal organs; the collection of specimens for chemical and biological analysis; the determination of the rate of respiration, the rate and force of the heart, and the blood pressure, and the measurement of the electric conductivity and freezing point of the blood. All the data have been obtained from fish taken, respectively, in salt, brackish, and fresh waters, and at progressive stages of reproductive activity, for the purpose of comparative study when the material has been completely worked up and analyzed. A special report covering certain phases of the study has recently been published.

The spoonbill catfish.—This large but rather coarse food fish of the Mississippi Basin, known to science as *Polyodon spathula*, is the object of rather important local fisheries, and as it is liable to commercial extermination its feeding and breeding habits were made the subject of investigation during the summer of 1904. The work has cleared up certain misapprehensions as to the feeding habits of this fish, but concerning the breeding season and habits nothing positive was determined, not one of 1,500 fish examined having significantly developed sexual glands.

Food of dogfishes.—For several years there have been conducted investigations upon the food of certain fishes of little or no food value, though of considerable indirect importance, and this work has been continued in 1905. Two species, the smooth dogfish and the horned dogfish, which were studied in southern New England, have been shown to be so destructive to food species as to be a distinct menace to the fisheries.

The smooth dogfish feeds principally on large crustaceans, nearly all of which are of direct economic value, and conspicuous among which is the lobster. Estimating the number of smooth dogfish in Buzzards Bay as 100,000, which is conservative, and allowing each dogfish one lobster in three days, there would be represented a destruction of 150,000 lobsters in one month, or 750,000 during the five months of the presence of the dogfish in the region.

In the vicinity of Woods Hole the principal food of the horned dogfish is a little jellyfish, but observations on other parts of the coast indicate that not only food fishes but the nets and lines of the fishermen are destroyed. Ground fishing in Boston Bay in 1903 yielded an average of $3 a day per man during July and August, but in 1904 the horned dogfish was present in such great numbers that it was impossible to catch anything else. When fish of value were taken they were torn in pieces by dogfish before they could be landed. Herring, mackerel, and other food fish are torn from the gill nets by this

species, which, when itself enmeshed, so tears the twine with its teeth and abrades it with its rough scales as to ruin the nets. It is estimated that in 1904 the loss in catch and gear from this cause amounted to $10,000 in Boston Bay alone, and the destruction extends in even greater measure northward. The damage has vastly increased in recent years.

The most practicable way to hold these destructive fishes in check would be to make them of commercial value. Although they have fewer enemies than most fishes, on the other hand they do not breed so rapidly, and if a market for them were created it would not be long until their numbers would decrease. This species offer commercial possibilities, of which some are suggested: (1) The skin makes a good polishing leather for metals and hard wood; it is used for this purpose by cabinetmakers in many parts of Europe. (2) The liver, at least of the horned dogfish, when boiled down into oil gives a fair yield, but at present the price of dogfish livers is too low to make this business pay. (3) The fins yield a considerable amount of glue; by simple boiling a fair quality was extracted. (4) The flesh is a wholesome food, and is eaten in Europe and elsewhere; it is free from bones, and when cooked it is of delicate texture, somewhat dry, with a good flavor, resembling halibut, but more delicate

STUDIES OF SMALL LAKES.

Connecticut lakes and neighboring waters.—In pursuance of the plan of the Bureau to undertake biological investigations of the principal waters of each of the large river basins of New England, the Connecticut lakes and neighboring waters in northern New Hampshire have been examined with special reference to the habits and distribution of the fishes. Sixteen species of fishes were ascertained to be indigenous to these waters, and 5 other species had been introduced, but of the latter only the landlocked salmon and the European brown trout are known to have survived. Apparently these lakes are well suited in every way to trout, lake trout, and landlocked salmon, having fairly deep, cool water and plenty of small fish to serve as food.

Lakes of northern Indiana.—The study of the lakes of northern Indiana was continued, the principal line of investigation pertaining to the aquatic plants and their relation to the fish life. Each of 18 small lakes in the region was examined with reference to the species of aquatic plants growing therein, the depths in which each species grows, the relations of each to the fish food, and the character of the bottom. Lake Maxinkuckee, which had been previously studied more thoroughly, was used as a standard with which to compare the conditions in other lakes. The general biology of Lake Maxinkuckee was studied during the fall and winter, special attention being given to the food of the different species of fishes at that season of the year. The

stomach contents of many examples of several different species were critically examined and much valuable information was obtained. The results of these various investigations will be published in a special report in due time.

FISH DISEASES, WATER POLLUTIONS, ETC.

A number of investigations of fish epidemics and stream contamination by factory and other refuse have been conducted during the year. These subjects are of very great and growing importance, and the Bureau, in addition to the consideration of diseases affecting fishes at its own stations, is constantly consulted by the state authorities regarding them. Instances of especial interest and requiring extended investigation have been an epidemic among brook trout at the Cold Spring Harbor station of the New York Forest, Fish, and Game commission; an epidemic that attacked the fish in the trout preserves of the South Side Sportsmen's Club, at Oakdale, Long Island; distress and mortality among fishes in the Bureau's aquarial exhibit at the Louisiana Purchase Exposition, where the service water contained an excess of lime due to the clarification process used by the city; and a mortality among trout at the Bayfield hatchery of the Wisconsin fish commission, which was being studied at the close of the year. Laboratory experiments have been conducted to determine the effects upon fishes of waters polluted with various industrial wastes, and at the request of the Maryland fish warden an effort was made to discover the cause of the weakness and death of numbers of fish in the Potomac at Cumberland and above, with the result that acid wastes from mining operations were found to be responsible.

MARINE BIOLOGICAL LABORATORIES.

The marine biological laboratories of the Bureau at Woods Hole, Mass., and Beaufort, N. C., were open during the usual summer season, and their tables were occupied by investigators from the principal institutions of learning in all parts of the United States. The facilities of the laboratories were used for the investigation of various questions important in the work of the Bureau and in marine biology in general, and a number of researches were made at the Bureau's instance and in its particular interest.

At the Woods Hole laboratory the principal feature of the work for the past two seasons has been the biological survey of neighboring waters and the cataloguing of results. The dredgings made by the steamers *Fish Hawk* and *Phalarope*, which were detailed for the purpose, furnish data from which, when complete, it is intended to compile records of the distribution of the entire fauna and flora of the region. Of other investigations of scientific and practical interest there

may be mentioned a study of the special senses of fishes, which was continued during the summer of 1904 with reference to the ear of the squeteague; the food of fishes of little or no food value, mentioned elsewhere in this report; an epidemic disease of menhaden in Narragansett Bay and certain parts of Buzzards Bay; the effects of various sorts of metal piping upon marine organisms kept in aquaria; certain properties of the blood of various marine animals; parasites of fishes; the quantity of fish consumed by marine birds, etc.

The fauna of the Beaufort region is being studied in a series of investigations undertaken by specialists in the various groups. The chelonians, crustaceans, tunicates, echinoderms, sponges, actinians, anthozoa, and also the algæ received attention during the summer of 1904, and in addition to the general collecting and observation of fishes of the region some studies of particular species were conducted. The oyster and clam experiments carried on at this laboratory have been mentioned elsewhere.

EXPEDITION TO THE EASTERN PACIFIC.

Early in the fiscal year arrangements were made to utilize the steamer *Albatross* in carrying on certain investigations in the eastern Pacific under the immediate direction of Mr. Alexander Agassiz. The vessel left San Francisco October 6, and several months were devoted to the work. Lines of soundings and dredgings were run from Panama to the Galapagos Islands; from the Galapagos Islands to Callao, Peru; Callao to Easter Island; Easter Island to the Galapagos; the Galapagos to the Gambier Islands, and thence to Acapulco. The character of the ocean floor was thus developed, and important collections resulted from the dredgings, affording many valuable data for the elucidation of the fauna of the regions visited.

STATISTICS AND METHODS OF THE FISHERIES.

CONDITION OF THE FISHING INDUSTRY.

The fisheries of the United States exhibit a substantial increase from year to year and as a whole are in a flourishing condition. Their growth has resulted from the invasion of new fishing grounds, the increased abundance of fishes due to protection and artificial propagation, the more active prosecution of the business in long-established lines, and the greater utilization of products which until a comparatively recent time were entirely disregarded or considered as of little economic value. These factors have more than compensated for the decline in some important branches owing to indiscreet fishing or to the inevitable effects of civilization on certain kinds of animal life and on certain small waters.

The value of the water products taken and sold by United States fishermen in 1905 was approximately $56,250,000, and this sum is exclusive of the very considerable fisheries of insular possessions and the immense quantities of fish taken for home consumption and by sportsmen. In no other country are the commercial fisheries more valuable as a whole than in the United States, and in no country is the financial condition of the fishing population better. The number of persons who make a livelihood in this industry is about 232,000, and the capital invested exceeds $82,000,000.

The most valuable of all the fishery products is the oyster, in the output of which the United States surpasses all other countries combined. The crop of 1905 may be placed at 32,000,000 bushels, with a market value of $15,760,000. The most significant feature of the industry is the growing appreciation of the benefits of oyster culture and of the desirability of selling or leasing barren bottoms for oyster planting. Each year a larger proportion of the oyster crop is taken from cultivated grounds and the business is thus placed on a more secure basis. It is estimated that in 1905 over 11,875,000 bushels, valued at $8,775,000, were marketed from private grounds. Virginia has recently assumed the first rank as an oyster-producing state, owing chiefly to the more general practice of oyster farming, the state's yield being now upward of 8,500,000 bushels, with a value to the producers of $3,250,000.

The great high-sea fisheries for cod, haddock, hake, halibut, mackerel, herring, and other well-known food fishes have been fairly successful as a whole, and have yielded about $7,500,000. The catch of both fresh and salt cod was somewhat less than in the previous year; that of haddock and hake was larger. The halibut fishery has been followed by fewer vessels, with a consequent falling off in catch. The take of mackerel was less than in any of the four preceding years; the sudden decrease in the abundance of this fish, beginning in 1886 and continuing to the present time, is one of the most remarkable cases of the kind. Swordfish were probably never known to be so abundant as in the summer and fall of 1904, and large numbers were captured for the New England markets.

The lobster fishery continues to show a diminishing yield, with a disproportionate increase in value. In 1905 the catch was less than in the previous year, and on the Massachusetts coast was particularly light. The decrease in the abundance of the lobster, which began about fifteen years ago and has been due to overfishing and violation of law, can be arrested only by extensive cultural operations and rigidly enforced restrictive measures. At present a large part of the lobsters consumed in the United States comes from Nova Scotia.

The whale fishery, which at one time was carried on by an immense fleet of fine sailing vessels and was the leading fishing industry of the

country, is now conducted chiefly with steamers in the north Pacific and Arctic oceans, and is an expensive, uncertain, and often unremunerative business. The value of the baleen, blubber oil, and sperm oil taken has been less than $900,000, and there is no reason to believe that the fishery will ever show any permanent improvement.

The anadromous fishes of the Atlantic and Pacific seaboards—the salmons, the shad, the alewives, the striped bass, the perches, etc.—have come to the streams in abundance, and represent $15,000,000 of income to the fishermen. The run of Atlantic salmon in the spring of 1905 was the largest in a number of years, and is generally attributed to artificial propagation, as natural reproduction is now almost suspended. The shad fishery was poor in the rivers, but good in the bays and along the outer shores. The salmon pack on the Pacific coast in 1904, aggregating over 2,800,000 cases, was somewhat less than in the previous year and very materially less than in 1902 and 1901. The decrease was in part due to the growing utilization of the catch in other ways than by canning, but also represented a decrease in the run of fish in two important regions—Alaska and Puget Sound. In the Sacramento River there was a noteworthy increase in the abundance of salmon, while in the Columbia River a larger catch was made at the expense of the future supply.

The fisheries of the Great Lakes have yielded over $2,700,000, and in general are in a satisfactory condition. The lake trout, lake herring, and pike perch have occurred in their usual abundance, but the whitefish has decreased, notwithstanding most active fish-cultural work.

The sponge fishery, confined to the coast of Florida, has special interest at this time because of the efforts of the Bureau to perfect a method of cultivation for maintaining the supply. The yield has continued to fall below that of previous years, and owing to the absence in the markets of desirable sizes the price has reached a higher point than ever before. The catch on the "key grounds" has been very small for several years, and the spongers attribute the fact to the prevalence of cloudy water, but there is little doubt that it is in large measure due to actual exhaustion of the grounds. Unquestionably there are places where the water rarely clears and on which a large catch could be made under favorable conditions, but the turbidity of the water in these places is no new thing and should not be cited as the cause of the continued small catch in the key region. On the "bay grounds" also the catch has been light for several years, owing to the depletion of the shoal-water grounds and the prevalence of unfavorable conditions which prescribed or interfered with the operations offshore. The limit of possibility of taking sponges by the ordinary method of hooking is reached in a depth of between 40 and 50 feet; but it is known that there are good sponges in greater depths

than that, and at the close of the fiscal year an attempt was being made by persons skilled in the methods used in the Mediterranean to take the sponges by diving on the virgin deep-water beds far from shore. Both sponge buyers and sponge fishermen are watching the results of this work with considerable interest.

STATISTICAL INQUIRIES AND REPORTS.

The facilities of the Bureau do not permit the collection of fishery statistics for the entire country every year, and it is therefore necessary to limit the inquiries to particular regions each year, the various groups of states being taken in turn. During 1905 the regular field force of statistical agents completed the canvass of the fisheries of the Great Lakes begun in May, 1904, and also took up and finished the fisheries of the Mississippi River and its tributaries and Lake of the Woods. Canvasses of the fisheries of the Middle Atlantic and Pacific States were begun and were in progress at the close of the year. Local agents at Boston and Gloucester, Mass., have obtained and submitted statistics of the extensive vessel fisheries centering at those ports; this information has been published in monthly bulletins and distributed among the trade, and an annual bulletin embodying current and comparative statistics has been issued. Statistical reports on the fisheries of the Gulf States, the South Atlantic States, and the interior waters of New York and Vermont have also been published.

SOME NEW FEATURES OF THE FISHING INDUSTRY.

It is proper at this time to notice at length certain recent developments and aspects of the American fisheries which are destined to have an important influence on the industry for many years to come. The following notes, based on information obtained by the agents of the Bureau, pertain to some of the leading branches of the fisheries on the Atlantic and Pacific coasts.

Purse seines in the bank cod fishery.—The introduction of the purse seine in what is known as the salt bank fishery dates from April, 1904, when the schooner *Marine Elliott*, of Gloucester, sailed for Sable Island equipped with a specially constructed purse seine and seine boat for catching cod and pollock. In May and June these fish have been observed to school in large numbers on the bars about Sable Island and in the bends of the island, where it is usually very difficult to take them with trawls, the fish often failing to notice the baited hook owing to the abundance of live food. As is well known, the native fishermen on the Labrador coast at certain times make fine hauls with small seines, and it was this fact that first led the captain of the *Marine Elliott* to consider seriously the question of using a purse seine in the salt bank cod fishery. It was obvious that if the

small seines could be used to such good advantage larger hauls could be made with purse seines and a fare secured in a much shorter time than by trawling or hand-lining. The schooner in question arrived home from the trip on June 23, 1904, with 203,000 pounds of salted pollock and 37,000 pounds of salted cod.

In the spring of 1905 two Gloucester vessels, the schooners *Emma E. Witherell* and *Tattler*, which are among the largest in the fleet, were fitted out for purse-seine cod-fishing. They sailed April 6, went to the Sable Island ground, and made quick fares. The former vessel arrived home June 26 with 263,600 pounds of salted pollock and 20,000 pounds of salted cod; and the latter arrived July 1 with 363,325 pounds of salted pollock and 11,000 pounds of salted cod. These fares were made in three to five weeks of actual fishing, a much shorter time than in the regular fishery, in which the vessels sail in February or March and are seldom home by July 1, and furthermore the quantities of fish caught were equal to or in excess of the fares of any vessels in the ordinary salt cod fishery.

The seines used in this new venture were 170 to 200 fathoms long and 12 fathoms deep, with a 4-inch mesh throughout. The method of fishing was the same as in the mackerel fishery. The fish were caught in water from 1 to 25 fathoms deep. The captains state that the seine can be used to advantage only in taking cod and other ground fish in shallow waters, such as those about Sable Island and at certain places on the Labrador coast and around the island of Anticosti, and not on the fishing banks in general; while pollock, which school near the surface, can of course be fished for wherever seen, without regard to the depth of the water. With reference to the size of the hauls, it is reported that 50,000 pounds were sometimes taken at one lift, and that a Nova Scotia vessel, the only other vessel thus far engaged in this fishery, at one set inclosed what was estimated to be 100,000 pounds, and came near losing her seine and boat as the fish settled; the purse line had to be cut and the fish allowed to escape, it being impossible to handle them.

While it is too soon to state the probable effect of the inauguration of purse seining on the prosecution of the salt cod fishery, it is believed that the method will be continued, that more vessels will engage in it, and that large fares of cod and pollock will be brought to our ports from grounds not hitherto exploited by American fishermen.

Seine-pursing machine.—Pursing machines have been in use for several years, and, having given satisfaction, have been adopted by nearly every vessel in the mackerel-seining fleet. Previous to their introduction the work of "pursing up" occupied from thirty to forty minutes and required the united efforts of the 15 men in the boat's crew. With one of these machines 6 men now can do the work in less than half that time and much more easily.

The machine consists of a set of cogwheels fixed to a shaft and geared so as to admit of considerable speed, and at the same time powerful enough to withstand a heavy strain. To each end of the shaft is attached a crank, the handle of which is long enough to permit three men to work abreast. When the seine has been set around a school of fish the ends are brought together in the usual manner, the purse davit shipped, the purse line rove through the snatch blocks fore and aft, and the seine is pursed by hand until there is a perceptible strain on both parts of the purse line, which are then led to the machine and placed around the drum, a man being stationed on the port side of the boat to coil the line as it is hove in and also to slack away if necessary. The men working the machine are relieved at intervals of a few minutes, and by the time two or three shifts have been made the seine is pursed.

Gill nets in the mackerel fishery.—Gill netting for mackerel was in vogue at the time hook-and-line fishing was extensively carried on, but a few years after purse seines came into general use it ceased to be remunerative, and was entirely abandoned by vessels until about seven years ago. The continuous scarcity of mackerel along the Atlantic coast for a number of years, during which seining proved very unprofitable, led to the revival of the old method, which has now been put in practice by a considerable portion of the seining fleet. During the last few years about 150 vessels, large and small, hailing from all parts of the New England coast, but many of them from Gloucester, have been engaged in this fishery. Seines are used only for schooling mackerel, but in order to be prepared also for fish not seen at the surface but thought to be near, the large vessels equipped with seines carry gill nets in addition.

"Dragging" for mackerel requires a considerable number of nets fastened together in one long string, called a "gang," and set from the vessel. The number of nets depends on the size of the vessel, 100 being the maximum and about 60 the average. As this kind of fishing is always carried on at night, it is somewhat difficult to keep track of the nets, particularly when it is very dark and a dozen or more vessels are operating in the same locality. To prevent other vessels of the fleet from crossing the nets, lights are attached to the outer and middle section of the gang, the buoys supporting the lanterns consisting of two pieces of boards fastened together in the shape of a cross, with a hole bored in the center to admit a staff some 3 or 4 feet long, from which hang the lanterns. Besides serving the purpose of warning other vessels as to the position of the nets, the light acts as a guide when it is necessary to cast the nets adrift on account of rough weather.

When the weather is pleasant and fish are fairly plentiful the nets require constant attention. They are visited in dories, and one man is supposed to tend 12 nets. Additional care is necessary when dogfish are numerous, and this is often the case when mackerel fishing is

best. It is sometimes necessary to haul the nets in order to prevent their complete destruction. A school of dogfish can in a single night damage a gang of nets sufficiently to keep an entire crew mending for a week. Larger sharks are even more destructive when in any considerable numbers, and not only tear the nets in their endeavors to reach the captured mackerel, but entangle themselves in such a way that they can scarcely be extricated without serious injury to the nets. The profits of the gill-net fishing may be largely measured by the presence or absence of these marauders during a season. For a number of years some of the larger vessels were compelled to abandon gill nets entirely and relied upon seines alone.

Both gill nets and purse seines are particularly well adapted to the mackerel fishery, but from an economic viewpoint it would seem that small vessels are better suited for dragging than large ones. The large vessels that have given up gill nets are few compared with the number of small craft that have adopted them, and the present indications are that dragging for mackerel will continue to be the chief method of capture by many vessels of this class.

Improvements in salmon canneries.—During the past decade great improvements have been made in the salmon canneries throughout Alaska. Large and well-lighted buildings have taken the place of low, small, and inferior ones; kerosene lamps have given way to electric lights in many instances, and other improvements have been introduced from time to time as the industry expanded; buildings, machinery, and nearly everything connected with the business have undergone a complete change.

All buildings connected with the salmon fishery are erected close to the water's edge, in order that the catch may be landed at the door of the cannery with one handling and to facilitate the loading of the ships at the end of the season. The early canneries were divided into spaces for storing nets, boats, lumber, boxes, cans, and other material, only a portion of the building being utilized for canning purposes. Most canneries now have separate storehouses, or are large enough to accommodate the material which is to be kept under cover without infringing upon the working room in the cannery proper. Besides the buildings formerly considered requisite, several more—such as blacksmith, machine, and boat shops, also a box factory and labeling room—are now counted indispensable to a first-class cannery.

The introduction of improved machinery and the much greater demand for salmon led to the installation of additional lines of machinery, until, from the one and two lines that were formerly considered sufficient, the number has gradually increased until six or seven lines are now used in some canneries. For the early canneries 20,000 cases in a season was an average pack; the improved machinery doubled the capacity of such canneries, and the installation of more

lines has brought about still further increase. There is a difference of over 4,000 cases per day between the output of a single-line and a seven-line cannery.

New products of the Pacific fisheries.—Considerable attention is now being given to the utilization of offal from salmon canneries, the demand for fish fertilizer having gradually increased in the last ten years until there are now three factories on the Pacific coast and two more will soon be in operation. The Hawaiian Islands and European countries are the principal importers of the product. Small shipments have been made to Japan also. The supply of material is practically inexhaustible. The offal from the Alaskan canneries in the last four years has amounted to about 43,000,000 pounds annually, and from canneries in Washington, Oregon, and California, 15,000,000 pounds annually. Two fertilizer plants, on the Columbia River and Puget Sound, use salmon offal almost entirely, but one located in Alaska depends chiefly on herring for its supply, although when there is a small run of herring whole humpback and dog salmon are used to some extent. Besides fertilizer, a considerable quantity of oil is manufactured at these establishments.

The canning of salmon and sardines on the Pacific coast has been followed by the canning of shad, halibut, etc. These products, however, have not met with extensive sale, as they are as yet in the experimental stage. The local demand at times has been quite encouraging, and the outlook seems to warrant more extended operations. The canned halibut placed on the market has met with considerable local favor, and as a result a company has been formed to exploit this product. Fancy brands of smoked halibut also are being prepared on Puget Sound.

For a number of years a company at Point Roberts, Wash., has been engaged in putting up salmon paste. The fish are ground up, cooked, and seasoned with spices, etc., and canned with gravy, making a very palatable dish. When warmed over and spread on bread or crackers, in the form of sandwiches, salmon paste is said to be delicious. It is a comparatively new article of food on the Pacific coast, but in Norway it has been used for many years.

The shrimp and crab fisheries of Puget Sound.—The casual catching of shrimp in Puget Sound waters in the last few years has led fishermen to believe that an industry of considerable importance might be developed, although until recently there was little or no sale for the product. The demand has slowly increased, however, and the fishermen have made a closer investigation of the grounds. Trials were first made with hand dredges from small boats in various parts of Hood Canal, and while no large body of shrimp was discovered the result was quite satisfactory, and soon two small steamers were engaged in the fishery, marketing their catch at Seattle and Tacoma. The

apparatus used is now largely beam trawls, in water ranging from 10 to 25 fathoms in depth. It is stated by the fishermen that the amount of shrimp taken has not been as large as was expected, and as yet the catch is barely sufficient to supply the local demand. Only a small portion of the ground in Puget Sound has been exploited for this product, however, and further trials may develop profitable areas. It is thought by fishermen that the Strait of Juan de Fuca, or the northern part of Puget Sound, in the vicinity of the San Juan Islands, may yield good results.

The crab fishery of Puget Sound is of considerable importance. Large numbers of crabs are taken annually in Semiahmoo and Bellingham bays and in waters adjacent to Dungeness. Smaller quantities are caught also in other parts of the sound. Wire pots, baited and buoyed in the same manner as lobster pots, are the principal means of capture. Most of the crabs taken are sold fresh, the chief market being Seattle, from which point they are shipped to various parts of the coast. The annual catch now amounts to nearly 300,000 pounds, with a value to the fishermen of approximately $12,000.

A few years ago the abundance of crabs in Semiahmoo Bay attracted the attention of cannerymen, and a crab cannery was established at Blaine, Wash., with a capacity of about 100 cases per day. The plant has been operated for several seasons, always at a loss, but there seems to be no reason why this product should not meet with a steady demand. It has been shipped in carload lots to brokers in various parts of the country, but only small quantities have reached the public, which is not aware of the existence of this excellent preparation.

Export trade in frozen and mild-cured salmon.—In the general expansion of the Pacific coast fisheries the salmon industry, the most important, has likewise undergone changes in the last few years. The major portion of the catch, as formerly, is canned, but with the growing demand for salted salmon the output of this product has increased until this branch of the industry has attained great importance. There has arisen also a considerable demand for mild-cured and frozen salmon, both finding a market in Europe, and the latter being sold in the United States also.

For a number of years the frozen salmon shipped to Europe were lightly smoked by the continental dealers, who thawed the fish and cured them in the usual way. It was found, however, that salmon which had been frozen for some time were not in as good condition for mild-curing as those cured shortly after being caught, and recently the curing has been done at cold-storage plants in the United States and the smoking has been done in Europe. Since 1892, when the shipping of fresh salmon to Europe in quantities began, the cold-storage plants have been improved, and the product now exported is of much better grade than that ten years ago.

The process of mild-curing followed shortly after the shipping of frozen salmon to Europe began, and the mild-cured product has met with considerable favor wherever introduced. The demand in the United States is said to be steadily increasing, and presumably the time is not far distant when as much of this product will be consumed in this country as is exported to Europe. Thus far Germany has offered the principal market, the superior facilities of the German cold-storage plants enabling them to supply many other European countries.

In order to meet the growing demand for mild-cured and frozen salmon, many of the Columbia River canneries have erected cold-storage plants, and these products are now prepared by all the packers on the Pacific coast. In the process of mild-curing only the choicest king salmon are accepted, and only the sides of the fish are used. They are "slack-salted" in tierces holding 800 to 1,000 pounds, and are kept in a cold room at even temperature until ready for shipment, when they are loaded into refrigerator cars, shipped across the continent, and thence to Europe. From the time of leaving the Pacific coast until arriving at their destination the fish undergo no change of temperature, and when unloaded from the ship are again stored in a freezing plant, where they remain until smoked. Owing to the fact that they are likely to deteriorate quickly when taken from cold storage, only enough are smoked at a time to supply the immediate demand.

Mild-cured salmon when smoked are considered much superior to the hard, dry-salted article; they bring 15 to 18 cents a pound, the latter 8 to 10 cents. The demand for the high-grade fish is chiefly from the first-class hotels and cafés, but the family trade also is large. The fish are cut into thin slices and made into sandwiches, or are prepared in other appetizing ways known to the Germans.

In 1904 there were 31 mild-curing and cold-storage plants on the Pacific coast—14 on the Columbia River, 6 on the Sacramento River, 4 on Puget Sound, 3 on Eel River, 1 at Grays Harbor, 1 on the Oregon coast, 1 at Monterey, and 1 at Taku Harbor. The output of mild-cured salmon in 1904 was over 12,000,000 pounds, a substantial increase over the preceding year. The amount prepared since 1897 has been approximately 38,204,000 pounds, with a total value to the fishermen of nearly $2,000,000.

In connection with this industry steamers fitted with freezing plants are now being brought into use, being especially valuable in collecting fish from waters where the run of salmon is not large enough to warrant the building of cold-storage plants. After being transported long distances in the usual way, salmon are unfit for mild-curing or freezing, and the catch in such isolated places has therefore been canned or salted. The vessels equipped with cold-storage facilities prove an advantage to the fishermen, who can thus dispose of their catch without the labor and expense of carrying it to the canneries, and can also

profit, because salmon suitable for mild-curing bring a higher price than do fish sold to the canneries. The expansion of this feature of the salmon trade will undoubtedly materially increase the importance of numerous small streams now of little consequence.

MISCELLANEOUS ADMINISTRATIVE MATTERS.

OPERATIONS OF VESSELS.

Steamer Albatross.—A liberal appropriation for the purchase and repair of scientific equipment allowed, for the first time since this vessel was built, the complete renewal of old apparatus, and the purchase of much-needed new equipment. The work of the vessel during the year consisted of a cruise of scientific exploration in the eastern Pacific, elsewhere described, which occupied the period from October 6, 1904, to April 5, 1905, and services in connection with the establishment of the new salmon hatchery in Alaska, in which she was engaged at the close of the year.

Steamer Fish Hawk.—The necessity for extensive repairs to this ship also developed during the year, and a special appropriation for this purpose and for an electric lighting plant permitted considerable refitting. The machinery is antiquated, however, has seen long service, and in the interests of safety and economy must soon be replaced. The vessel rendered service during the year in a survey of the oyster grounds of Matagorda Bay, Texas, as elsewhere mentioned, and was thus occupied from November 17 until May 12, when she was ordered to Woods Hole, Mass., for work in connection with the Bureau's biological laboratory at that place.

Schooner Grampus.—As in previous years, the *Grampus* was employed in strictly fish-cultural work connected with the marine hatcheries on the New England coast. Lobster eggs were collected for the Gloucester station early in the summer, and brood cod for the Woods Hole station were caught on Nantucket Shoals in October and November. On April 1 the vessel was again placed in commission and went to the Maine coast, where she was engaged in collecting lobster eggs at the close of the fiscal year. At such times as she was not in active use, her crew was utilized on shore at the different hatcheries. This schooner, which was built in 1886, is beginning to show the effects of long service and will soon be in need of considerable repairs and rebuilding to put her in seaworthy condition. Some alterations in hull and rigging are also necessary to insure efficiency and to keep pace with modern requirements. It is regarded as especially desirable that she be supplied with auxiliary motor power, which, without materially increasing the expense of maintenance, would add greatly to her usefulness.

New launches, etc.—A special appropriation provided for the purchase of a powerful gasoline launch suitable for harbor use in heavy

weather at the Gloucester, Mass., station. This boat is especially adapted for the work required, is 33 feet long and 9 feet beam, has an 8-horsepower motor, and is stoutly built with inclosed cabins. Launches were purchased also for the Baker Lake (Wash.) station, and for the auxiliary station at La Crosse, Wis. These are motor boats 27 feet and 30 feet long, respectively, and are indispensable for conducting the work at those points.

PUBLICATIONS AND LIBRARY.

During the year the bound volumes of the report for 1903 and the bulletin for 1902 were issued, the parts composing these volumes having been published and distributed separately some time before. The bulletin for 1903 has been reserved for the various contributions on the aquatic resources of the Hawaiian Islands resulting from the special investigations in 1901 and 1902; some of the special papers of this series have already appeared, but owing to the large amount of material in some of the collections and the time required for its study, a year or more may elapse before the final volume is issued. The following pamphlet extracts from reports and bulletins were published and distributed in 1905:

Report of the Commissioner of Fisheries to the Secretary of Commerce and Labor for the year ending June 30, 1904.

Report of the special commission for the investigation of the lobster and the soft-shell clam. Report for 1903.

Publications of the United States Fish Commission available for distribution on June 30, 1903. Report for 1903.

The commercial fisheries of the interior lakes and rivers of New York and Vermont. By John N. Cobb. Report for 1903.

The echinoderms of the Woods Hole region. By Hubert Lyman Clark. Bulletin for 1902.

List of fishes dredged by the steamer *Albatross* off the coast of Japan in the summer of 1900, with descriptions of new species and a review of the Japanese Macrouridæ. By David Starr Jordan and Edwin Chapin Starks. Bulletin for 1902.

Investigations for the promotion of the oyster industry of North Carolina. By Caswell Grave. Report for 1903.

A revision of Malaclemmys, a genus of turtles. By William Perry Hay. Bulletin for 1904.

The medusæ of the Woods Hole region. By Charles W. Hargitt. Bulletin for 1904.

The osteology and immediate relations of the tile-fish, Lopholatilus chamæleonticeps. By Frederic A. Lucas. Bulletin for 1904.

The blood vascular system of the tile-fish, Lopholatilus chamæleonticeps. By C. F. Silvester. Bulletin for 1904.

The fish parasites of the genus Argulus found in the Woods Hole region. By Charles B. Wilson. Bulletin for 1904.

The seaweed industries of Japan. The utilization of seaweeds in the United States. By Hugh M. Smith. Bulletin for 1904.

The function of the lateral-line organs in fishes. By G. H. Parker. Bulletin for 1904.

Isopods from the Alaska salmon investigation. By Harriet Richardson. Bulletin for 1904.

List of fishes collected in Boulder County, Colo., with description of a new species of Leuciscus. By Chancey Juday. Bulletin for 1904.

The biological relation of aquatic plants to the substratum. By Raymond H. Pond. Report for 1903.

State ichthyology of Massachusetts. By Theodore Gill. Report for 1904.

The fish fauna of the Tortugas Archipelago. By David Starr Jordan and Joseph C. Thompson. Bulletin for 1904.
The distribution of sewage in the waters of Narragansett Bay, with special reference to the contamination of the oyster beds. By Caleb Allen Fuller. Report for 1904.
Statistics of the fisheries of the South Atlantic States, 1902. Report for 1903.
Statistics of the fisheries of the Gulf States, 1902. Report for 1903.
New star-fishes from deep water off California and Alaska. By Walter K. Fisher. Bulletin for 1904.
The cultivation of marine and fresh-water animals in Japan. By K. Mitsukuri. Bulletin for 1904.

There were sent out during the year 2,513 bound and 16,166 pamphlet publications of the Bureau. The principal recipients of the publications are libraries, institutions of learning, collaborators, and specialists; but aside from these there is a large and increasing demand for the various articles from persons interested in the particular phases of the fisheries therein discussed. Requests are received daily for certain publications the supply of which has been exhausted, the demand for the Manual of Fish Culture being particularly active. Two editions of this very popular and useful work have been entirely distributed, and another edition should soon be provided.

The library has been increased by the addition of 159 bound volumes and 307 unbound volumes and pamphlets, these, as usual, being works pertaining to the special needs and functions of the Bureau.

EXPOSITIONS.

The exhibit of the Bureau at the Louisiana Purchase Exposition at St. Louis, which came to a close December 1, 1904, won favorable comment. The fisheries building was unique in design, and lent itself to an advantageous and attractive installation. It was 136 feet square, with a central court 74 feet square, having in the center a pool 24 feet square open to the sky. In the court was arranged the general exhibit, and separated from it by screened corridors 15 feet wide was the aquarium, extending around the building. The aquarium tanks, 40 in number, were along the walls and lighted from the rear; the corridors being in semidarkness, the animals in the tanks were plainly visible, and the general effect was pleasing to the eye. The machinery room, containing pumps, motors, filters, refrigerating machine, etc., and the reservoirs of fresh and salt water were underneath the main floor.

In the aquarium were kept the fresh and salt water fishes propagated by the Bureau and such other important and curious fishes and water animals as it was possible to obtain and transport. From 100 to 150 species were always in the tanks, and were constantly renewed by fresh supplies brought from different parts of the country in the care of the Bureau. The Illinois state commission contributed to the interest of the display by maintaining in one of the large tanks a fine collection of the river fishes of that state. The central pool contained seals, sturgeon, large catfish, and various kinds of turtles.

The general exhibit was designed to show the scope and functions of the Bureau as comprehensively as possible, and was as complete as space would allow. Artificial propagation was illustrated by examples or models of apparatus and appliances used in collecting and hatching eggs and distributing fishes, and throughout the exposition there were demonstrations of actual hatching on a scale of considerable magnitude, many millions of eggs being utilized. This was supplemented by mutascope pictures of fish-cultural methods as applied to different species, as well as photographs and drawings, together with charts showing some of the practical results. A model of the special railway cars used in transporting live fishes was shown, and on a railway siding near the building one of the cars employed in bringing stock for the aquarium was open for inspection when in the grounds.

It is not easily possible to show the work of the division of scientific inquiry with any degree of completeness, but in the space allotted to this branch were exhibited the appliances used for collecting specimens, such as trawls, dredges, tangles, seines, and surface, intermediate, and deep-sea tow nets, etc., the appliances for physical research, and models of vessels maintained for ocean investigation. Experiments in oyster culture and sponge culture were illustrated, and a fine working model of the apparatus used by the Rhode Island fish commission in rearing lobsters was in operation. There were collections showing the anatomy, growth, variations, and distribution of lobsters, oysters, clams, and other crustaceans and mollusks, and a series of enlarged models of trout eggs in different stages of development. Studies in fish pathology were illustrated by a display of cultures of bacteria and by a series of colored drawings of fishes showing the gross appearances of special diseases.

Products of the fisheries were shown by a small but comprehensive display of fish prepared for food in various ways, collections of oils, fertilizers, glues, isinglass, leathers made from skins of water animals, furs, whalebone, walrus ivory, tortoise shells, pearl shells, etc.; and the methods of capture by models of types of modern fishing vessels used on various parts of the coast, and by specimens of nets, traps, seines, trawls, hand lines, dredges, tongs, and other appliances. There was also a very complete series of colored photographs and mutascope views of fishing scenes.

At the close of the exposition most of the material was shipped to Portland, Oreg., as part of the exhibit of the Bureau at the Lewis and Clark Centennial exposition, which opened May 1, 1905.

NORTH CAROLINA SHAD FISHERY AND LEGISLATION.

For several years the very valuable shad fishery of North Carolina has been declining, and in consequence of the scarcity of ripe fish the Bureau's shad hatching operations in that State have been much inter-

fered with. The decline is generally ascribed to the capture of an increasingly and inordinately large percentage of the run of spawning fish in salt water, owing to the setting of numerous fixed and movable devices in such a way as to intercept the schools. The seriousness of the situation was fully appreciated by the state legislature, and measures for the protection of the shad were considered at the last session. The deputy commissioner of the Bureau, having made an investigation of the condition and needs of the fishery, appeared before the legislature by invitation and gave the results of his observations and made suggestions for improving the fishery. Shortly afterwards the legislature enacted special laws along the lines advocated by the Bureau, which it is expected will prove effective.

FOREIGN INQUIRIES.

In past years, as opportunity afforded or occasion arose, the Bureau has conducted special investigations of the fisheries and fish-cultural work of foreign countries. In 1905 there was undertaken an inquiry concerning the cod fishery and the cod-liver oil industry of Norway, with a view to determining the factors that contribute to the superiority of the medicinal cod-liver oil prepared in Norway, this inquiry being in pursuance of a joint study of domestic and foreign fish oils which has been in progress by this Bureau and the Bureau of Chemistry of the Department of Agriculture. A representative of the Bureau of Fisheries visited the cod-fishing districts of Norway and became personally acquainted with the methods of fishing, of handling the fish and livers, and of extracting and refining the oil.

In conjunction with the foregoing inquiries, various European fish-cultural establishments were inspected, in order that the Bureau might be informed regarding the methods and progress of pisciculture abroad. Among the stations visited was the celebrated cod and lobster hatchery near Arendal, Norway, which was the first of its kind and has served as a model for the marine hatcheries in other countries, including the United States.

AMERICAN FISHERIES SOCIETY.

The thirty-first annual meeting of the American Fisheries Society was held at Atlantic City, N. J., July 26–28, 1904. The president for the current year was Mr. Frank N. Clark, superintendent of the Michigan stations of the Bureau of Fisheries. About 70 persons, representing 28 states and territories, were in attendance, and all branches of the fishery interests were represented. The papers and discussions covered many phases of the work in which the Bureau and the various states are engaged, and the meeting proved one of the most successful in the history of the society. At the invitatlon of the United States Fish Commissioner, the society voted to hold its next

meeting at White Sulphur Springs, W. Va., with a view to giving the members an opportunity to inspect the newly completed government fish hatchery at that place.

In conjunction with the meeting, most of the station superintendents were ordered to report for a conference with the administrative officers of the Bureau. All the superintendents are members of the society, and, besides taking active part in the proceedings, they were enabled to compare methods and experiences, and to receive instructions looking to the more complete systematization and coordination of the work between stations and stations and between stations and the central office. Such gatherings of the station superintendents are productive of much good to the service, and should be held annually, preferably in conjunction with the meetings of the American Fisheries Society.

INTERNATIONAL FISHERY CONGRESS.

An international fishery congress was held at Vienna in June, 1905, under the patronage of the Austrian fishery society. About 20 countries were officially represented, and nearly 400 delegates were in attendance, including the most distinguished fishery, fish-cultural, and ichthyological authorities of Europe. The United States was represented by the deputy commissioner of the Bureau of Fisheries. The proceedings of the congress covered a wide range of subjects and proved of great practical interest. On behalf of the Secretary of Commerce and Labor and of the Commissioner of Fisheries an official invitation was extended to the congress to hold its next meeting in the United States. The invitation was unanimously accepted, the time for the meeting was fixed for the latter part of September, 1908, and the place selected was Washington, D. C.

APPROPRIATIONS.

The appropriations for the Bureau of Fisheries for the fiscal year 1905 were as follows:

Salaries	$271,660
Miscellaneous expenses:	
Administration	12,500
Propagation of food fishes	230,000
Inquiry respecting food fishes	25,000
Statistical inquiry	7,500
Maintenance of vessels	50,000
Protection of salmon fisheries in Alaska	7,000
For the establishment of one or more salmon hatcheries in Alaska	50,000
For the purchase of additional land, for improvements, and for completion of stations at—	
Boothbay Harbor, Me	10,000
White Sulphur Springs, W. Va	11,000
Tupelo, Miss	7,500
Neosho, Mo	11,000

For improvements and completion of stations at—	
Craig Brook, Me	$9,300
Green Lake, Me	15,700
Gloucester, Mass	5,500
Wytheville, Va	2,200
Manchester, Iowa	5,000
Northville, Mich	5,000
Leadville, Colo	7,500
For additions and improvements, biological laboratory at Beaufort, N. C.	6,000
For purchase and repair, scientific equipment, steamer *Albatross*	10,000
For general repairs, steamer *Fish Hawk*	7,500
For purchase of launch	2,000
Total	768,860

A report of the expenditures under these appropriations will be made in accordance with law.

RECOMMENDATIONS.

NEW FISH HATCHERIES.

During the Fifty-eighth Congress many bills providing for new fish hatcheries were presented in the House and Senate and later referred to the Bureau by the proper committees for recommendation. In most cases it was possible to make favorable reports on the measures, as the bills provided for the establishment of hatcheries either in states where none now exists or in regions where additional stations are clearly demanded by the magnitude of the fisheries and the extent of the waters to be stocked. As it is a much simpler task to maintain the fish supply of given waters than to restock the waters after depletion, the early passage of the most meritorious of the bills is advocated.

The popularity of catfish for the stocking of public and private waters is yearly becoming greater, and the Bureau is unable, with its present facilities, to meet the demand. The various species of catfishes are hardy, prolific, and very palatable, and are among the best fishes for certain waters, especially those of the central region of the United States. It is therefore recommended that Congress authorize the establishment of a station where catfish shall be the principal species cultivated.

IMPROVEMENT OF STATIONS.

At several of the fish-cultural stations of the Bureau, improvements, constructions, and repairs are required which can not be paid for out of the general appropriation for propagation of food fishes, and will therefore have to be provided for by special appropriation. Among the stations at which such improvements are necessary are Battery Island, Md., Wytheville, Va., Manchester, Iowa, and Baird, Cal.; items covering the desired work will be inserted in the next estimates of the Bureau.

The fish-cultural property of the Bureau at San Marcos, Tex., would be improved by the elimination of the public road that now intersects the government reservation, necessitating the maintenance of two otherwise unnecessary fences and completely isolating that part of the property which abuts on the San Marcos River. It is recommended that authority be granted to acquire, by purchase or otherwise, the section of road through the station grounds and to provide the city of San Marcos with another and more direct road across the river.

FISH LAKES, WASHINGTON, D. C.

The fish lakes of the Bureau located in the city of Washington near the Potomac, and comprehended in the parking system, were established many years ago by act of Congress for the propagation of carp, but for a long time have been devoted exclusively to the cultivation of the basses. The station grounds are quite extensive, and the necessity for maintaining them in a manner befitting government property in the Mall considerably increases the operating expenses of the station without any benefits to the fish-cultural work. Under these circumstances, the abandonment of this station is to be recommended as soon as provision is made for conducting this work elsewhere. The new site should be in Maryland or Virginia, preferably in the vicinity of Washington, and should be provided with an ample supply of water secured by gravity and with adequate space for an elaborate pond system.

ACCLIMATIZATION OF THE EASTERN LOBSTER ON THE PACIFIC COAST.

Although the efforts heretofore made by the Bureau to acclimatize the eastern lobster on the Pacific coast have not been successful, there is every reason to believe that the scheme is feasible, and the attempt should be renewed on a scale commensurate with the extent of the waters to be stocked. There is probably no other fishery product of the eastern seaboard whose acclimatization would be such a boon to the entire west coast, and the prospective economic importance of the project warrants the government in undertaking it. It is therefore strongly recommended that Congress make a sufficient appropriation to enable the Bureau to collect, transport, and plant a large consignment of lobsters at a number of suitable points in California, Oregon, Washington, and Alaska.

PROTECTION OF FISHES.

Several cases have recently arisen suggestive of the benefits that might accrue to the fishing industry if the general government exercised jurisdiction. These cases also show how the fish-cultural work of the Bureau of Fisheries and of the state fish commissions may be

counteracted and perhaps rendered entirely nugatory, and how valuable station property may be rendered worthless, through failure of the states to afford proper protection to the fishes.

Attention may be drawn particularly to the salmon fisheries of the Pacific States. These fisheries are so extensive and exhausting, and the property interests involved are so valuable, that every precaution should be taken to insure the unimpaired perpetuation of the various species of salmon, as has been done in California. It would appear, however, that elsewhere the trend of public sentiment is in the direction of the greatest freedom of fishery, with little or no regard for even the near future. This is shown by the curtailing of already too short closed seasons on the Columbia and other rivers, by the erection of impassable dams in streams that salmon are wont to ascend to spawn, and by the unrestricted operation of fishing devices in localities where they are known to be unnecessarily destructive. A pernicious example of the last-named condition is the multiplication of pound nets and gill nets about the mouth of the Skagit River on Puget Sound, notwithstanding the well-known facts that it is the only stream in that region in which there is a noteworthy run of blueback or sockeye salmon for spawning purposes, and that the only hatchery operated chiefly for this species is located on Baker Lake, at the head of that stream. In 1905 some of the pound nets in question took 10,000 bluebacks in twenty-four hours, and the entire run of fish for reproductive purposes was reduced to 2,500. The present indications are that the Baker Lake hatchery may shortly have to be abandoned, because the run of fish will have been annihilated.

The attitude of indifference on the part of particular states to the preservation of valuable natural resources like the fresh-water and anadromous fishes and the lack of appreciation of the beneficent work carried on by the government through the Bureau of Fisheries demand serious attention. It is respectfully recommended that consideration be accorded the proposition to discontinue all government fishery work in those states that exhibit no healthy sentiment in favor of the preservation of their supply of food and game fishes, Congress being asked to grant such authority, if necessary.

Another very serious menace to the welfare of food fishes in the Western States is the irrigation operations. While the industries dependent on irrigation are, of course, much more extensive than fishing, this would seem to be no valid reason for overlooking or neglecting the fish life of the streams. The damage to the fish supply caused by irrigation depends on several factors. Thus a large portion of the volume of a stream or even the entire volume may be diverted from regular channels into irrigation ditches, carrying fish of all kinds and sizes, which eventually perish on the irrigated lands. Again, when a large volume of water is taken from a natural stream the remaining

water often becomes warm, stagnant, and unfit for trout or other desirable species. In some states the destruction of fish life from these causes has already become serious and is generally deprecated. Much of the loss might be averted by placing a simple and inexpensive device—such as a paddle wheel or screen—at the head of ditches so that fishes would be frightened away from the intake or prevented from entering it. The general state superintendent of fish hatcheries for Colorado reports that unless laws are enacted requiring the placing of screens or wheels in the irrigation ditches the fishing industry of that state will be seriously imperiled; and similar testimony has come from well-informed persons in Montana and other states. In the event of the failure of the state legislatures to afford effective and prompt relief, a general federal law, applicable to all waters for the utilization of which the government has given aid, may become necessary.

Respectfully, George M. Bowers,
Commissioner.

The Secretary of Commerce and Labor.

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THE PROPAGATION AND DISTRIBUTION OF FOOD FISHES IN 1905

Bureau of Fisheries Document No. 602

THE PROPAGATION AND DISTRIBUTION OF FOOD FISHES IN 1905.

INTRODUCTION.

The principal function of the Bureau of Fisheries, the maintenance and increase of the available supply of aquatic food products, has its largest fulfilment in the artificial propagation and distribution of fish and eggs. The extensive and depleting commercial fisheries for a number of species and the constantly growing demand for food and game fishes for stocking private lakes and streams have led to such an enlargement of the field of operations that about fifty species are now cultivated, the list including the principal fishes of all parts of the country. Nor is the work confined to the hatching and rearing of fish by artificial methods. A very important feature is the rescue of young fishes from the overflowed lands in the Mississippi Valley, where they would be lost when the waters recede, for the sloughs, cut off from the river, become dry in the heat of summer or freeze in winter. Furthermore, some of the most valuable and far-reaching results have come from the acclimatization of nonindigenous fishes in various waters.

SPECIES CULTIVATED AND DISTRIBUTED.[a]

The following species, listed by families, were handled in 1905:

THE CATFISHES (SILURIDÆ):

- *§ Spotted cat, blue cat, channel cat (*Ictalurus punctatus*).
- *§ Horned pout, bullhead, yellow cat (*Ameiurus nebulosus*).
- * Marbled cat (*Ameiurus nebulosus marmoratus*).
- § Black cat (*Ameiurus melas*).

THE SUCKERS AND BUFFALOFISHES (CATOSTOMIDÆ):

- § Buffalofishes, chiefly *Ictiobus bubalus*.

THE MINNOWS AND CARPS (CYPRINIDÆ):

- † || Carp (*Cyprinus carpio*).
- ‡ || Goldfish (*Carassius auratus*).
- ‡ || Tench (*Tinca tinca*). Cultivated variety, golden tench.
- ‡ || Ide (*Leuciscus idus*). Cultivated variety, golden ide.

THE SHADS AND HERRINGS (CLUPEIDÆ):

- * Shad (*Alosa sapidissima*).

[a] The fishes artificially propagated are designated thus, *; those simply collected and distributed, thus, §; those propagated as food for other fishes, thus, †; those propagated for ornamental purposes, thus, ‡; and introduced species, thus, ||.

THE SALMONS, TROUTS, WHITEFISHES, ETC. (SALMONIDÆ):

*Common whitefish (*Coregonus clupeiformis*).
*Bluefin whitefish (*Argyrosomus nigripinnis*).
*Lake herring, cisco (*Argyrosomus artedi*).
*Chinook salmon, king salmon, quinnat salmon (*Oncorhynchus tschawytscha*).
*Silver salmon, coho (*Oncorhynchus kisutch*).
*Blueback salmon, red-fish, sockeye (*Oncorhynchus nerka*).
*Humpback salmon (*Oncorhynchus gorbuscha*).
*Steelhead, hardhead, salmon trout (*Salmo gairdneri*).
*Rainbow trout (*Salmo irideus*).
*Atlantic salmon (*Salmo salar*).
*Landlocked salmon (*Salmo sebago*).
*Yellowstone Lake trout, cutthroat trout, black-spotted trout (*Salmo lewisi*).
*Colorado River trout, black-spotted trout (*Salmo pleuriticus*).
*Arkansas River trout, green-backed trout (*Salmo stomias*).
*Yellow-finned trout (*Salmo macdonaldi*).
|| *Sea trout, salmon trout (*Salmo trutta*).
|| *Loch Leven trout (*Salmo trutta levenensis*).
*Lake trout, Mackinaw trout, longe, togue (*Cristivomer namaycush*).
*Brook trout, speckled trout (*Salvelinus fontinalis*).
*Golden trout, Sunapee Lake trout (*Salvelinus aureolus*).
*Canadian red trout (*Salvelinus marstoni*).
*Hybrid trout (*Salvelinus fontinalis+aureolus*).

THE GRAYLINGS (THYMALLIDÆ):

*Montana grayling (*Thymallus montanus*).

THE PIKES AND PICKERELS (ESOCIDÆ):

*Pike or pickerel (*Esox lucius, Esox reticulatus*).

THE BASSES, SUNFISHES, AND CRAPPIES (CENTRARCHIDÆ):

*§ Crappie (*Pomoxis annularis*).
*§ Strawberry bass, calico bass (*Pomoxis sparoides*).
*§ Rock bass, red-eye, goggle-eye (*Ambloplites rupestris*).
*§ Warmouth, goggle-eye (*Chænobryttus gulosus*).
*§ Small-mouth black bass (*Micropterus dolomieu*).
*§ Large-mouth black bass (*Micropterus salmoides*).
*§ Bluegill sunfish (*Lepomis incisor*).
§ Other sunfishes, chiefly *Eupomotis gibbosus*.

THE PERCHES (PERCIDÆ):

*§ Pike perch, wall-eyed pike, yellow pike, blue pike (*Stizostedion vitreum*).
*§ Yellow perch (*Perca flavescens*).

THE SEA BASSES (SERRANIDÆ):

*Striped bass, rockfish (*Roccus lineatus*).
*White perch (*Morone americana*).

THE LABRIDS (LABRIDÆ):

*Tautog (*Tautoga onitis*).

THE CODS (GADIDÆ):

*Cod (*Gadus callarias*).
*Pollock (*Pollachius virens*).

THE FLOUNDERS (PLEURONECTIDÆ):

* Winter flounder, American flatfish (*Pseudopleuronectes americanus*).

CRUSTACEANS:

* American lobster (*Homarus americanus*).

THE OUTPUT.

The output for the year 1905 was over 250,000,000 more than for any previous year in the history of the Bureau. This increase represents in particular a greater production of Pacific salmons, lake trout, pike perch, yellow perch, large-mouth black bass, lake herring, and lobster, and in addition the propagation of the bluefin whitefish for the first time. Cod, whitefish, and all other species cultivated, except the shad, furnished an average yield. The shad output was unusually small, owing, apparently, to the fact that an unusual proportion of the marketed fish were caught in salt or brackish water, but few being left to reach the spawning grounds, where the eggs are obtained for the hatcheries.

A summary of the output for the year 1905 is shown in the following table:

SUMMARY OF DISTRIBUTION OF FISH AND EGGS DURING THE FISCAL YEAR 1905.

Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Catfish			427,425	427,425
Buffalofish			214,000	214,000
Shad	378,000	32,859,000		33,237,000
Whitefish	60,963,000	268,405,000		329,368,000
Bluefin whitefish	380,000	1,000,000		1,380,000
Lake herring	87,040,000	35,000,000		122,040,000
Chinook salmon	96,055,775	21,620,288	5,125	117,681,188
Silver salmon	107,000	10,633,900		10,740,900
Blueback salmon		7,819,281	10,000	7,829,281
Steelhead trout	139,400	635,905	51,638	826,943
Rainbow trout	286,000	442,160	345,204	1,073,364
Atlantic salmon	8,000	727,462	289,188	1,024,650
Landlocked salmon	192,000	275,004	130,477	597,481
Blackspotted trout	305,000	41,205	6,388,031	6,734,236
Scotch sea trout			3,479	3,479
Loch Leven trout		27,000	2,062	29,062
Lake trout	5,320,000	35,993,266	11,469	41,324,735
Brook trout	456,000	8,933,881	1,083,454	10,473,335
Golden trout		157,490	269	157,759
Grayling	400,000	450,000	20	850,020
Pike and pickerel			62,200	62,200
Crappie and strawberry bass			859,592	859,592
Rock bass			58,099	58,099
Warmouth bass			2,200	2,200
Small-mouth black bass			191,665	191,665
Large-mouth black bass			713,111	713,111
Sunfish or bream			447,908	447,908
Pike perch	152,750,000	246,148,775	395	398,899,170
Yellow perch	5,000,000	139,452,521	326,715	144,779,236
Striped bass		2,463,000		2,463,000
White perch	700,000	23,700,000		24,400,000
Tautog		2,983,000		2,983,000
Cod		169,577,000		169,577,000
Pollock		8,456,000		8,456,000
Flatfish		203,356,000		203,356,000
Lobster		116,214,000		116,214,000
Total	410,480,175	1,337,371,138	11,623,726	1,759,475,039

In addition to the above the experiment was tried of introducing into Lake Saline, near Palestine, Tex., 1 barrel of reef oysters, 24 blue crabs, and 157 marine fishes, among which 5 species were represented.

THE STATIONS.

Fish-cultural work is at present conducted at 32 stations and numerous substations, the latter being auxiliaries operated only at particular seasons. Some of them are the principal sources of the egg supply in their respective regions; others are important as distributing points. In the following list, which shows the output of the various stations, the character of the work conducted at each is indicated by arbitrary signs, thus: Stations where eggs were hatched during 1905, *; stations used merely as egg-collecting points, §; stations concerned in the work of rescuing fishes from the overflowed lands, †.

STATIONS AND SUBSTATIONS OPERATED IN 1905.

Name and location.	Period of operation.	Fishes handled.
*Baird, Cal	Entire year	Quinnat salmon and golden trout.
*Battle Creek, Cal	Sept. 6 to Dec. 19	Quinnat salmon.
*Mill Creek, Cal	Sept. 23 to Feb. 6	Do.
*Baker Lake, Wash	Entire year	Blueback, silver, and quinnat salmons.
*Birdsview, Wash	do	Silver salmon and steelhead trout.
*Battery, Havre de Grace, Md	Feb. 16 to May 28	Yellow perch, white perch, and shad.
*Boothbay Harbor, Me	Entire year	Cod and lobster.
§Johns Bay, Me	July 1 to May 30	Lobster.
§Portland, Me	July 1 to Aug. 16 and Apr. 1 to June 30.	Do.
*Bozeman, Mont	Entire year	Brook, rainbow, steelhead, and blackspotted trouts; grayling and whitefish.
§Henrys Lake, Idaho	Apr. 1 to June 30	Blackspotted trout.
*Redrock Lake, Mont	Apr. 6 to June 26	Grayling.
*Bryan Point, Md	Mar. 9 to May 20	Yellow perch and shad.
*Cape Vincent, N. Y	Entire year	Whitefish; lake, brook, and steelhead trouts; landlocked salmon, and pike perch.
*Central Station and aquaria, D. C	do	Whitefish, brook trout, silver salmon, yellow perch, pike perch, spotted catfish, and shad.
*Clackamas, Oregon City, Oreg	do	Quinnat, landlocked, and silver salmons; rainbow, lake, and brook trouts.
§Cedar Creek, Oreg	Feb. 10 to Mar. 30	Steelhead trout.
*Grants Pass, Oreg	Jan. 15 to Apr. 30	Silver salmon and steelhead trout.
*Little White Salmon, Wash	July 1 to Feb. 12	Quinnat salmon.
§Big White Salmon, Wash	Latter part of August to Nov. 30.	Do.
§Eagle and Tanner Creeks, Oreg.	Aug. 23 to Oct. 21	Do.
*Rogue River, Oreg	Entire year	Quinnat and silver salmons; rainbow, steelhead, and blackspotted trouts.
§Tolo, Oreg	Mar. 16 to Apr. 30	Steelhead trout.
*Upper Clackamas, Oreg	Aug. 1 to Nov. 30 and May 4 to June 30.	Quinnat salmon.
*Willamette, Portland, Oreg	Apr. 7 to June 30	Blackspotted, brook, rainbow, and steelhead trouts; landlocked salmon.
*Cold Springs, Bullochville, Ga	Entire year	Large-mouth and small-mouth black basses; warmouth bass, strawberry bass, crappie, catfish, and sunfish.
*Craig Brook, East Orland, Me	do	Atlantic, landlocked, and silver salmons; brook, lake, rainbow, and Scotch sea trouts.
§Sebec Lake, Me	Sept 26 to Nov. 10 and Apr. 10 to May 31.	Landlocked salmon.
*Upper Penobscot, Stacyville, Me.	Nov. 15 to May 25	Atlantic salmon.
*Delaware River, Torresdale, Pa	Apr. 22 to May 31	Shad.

STATIONS AND SUBSTATIONS OPERATED IN 1905—Continued.

Name and location.	Period of operation.	Fishes handled.
* Duluth, Minn	Entire year	Lake, brook, and steelhead trouts; landlocked salmon, whitefish, bluefin whitefish, and pike perch.
§ Isle Royale, Mich	Oct. 17 to Oct. 30	Lake trout.
§ Keystone, Mich	Oct. 8 to Nov. 2	Do.
§ Marquette, Mich	Oct. 15 to Nov. 8	Do.
§ Ontonagon, Mich	Sept. 17 to Nov. 4	Bluefin whitefish and lake trout.
§ Point Magnet, Ontario	Sept. 16 to Oct. 9	Lake trout.
§ Rossport, Ontario	do	Do.
§ Susie Island, Minn	Nov. 1 to Nov. 19	Do.
* Edenton, N. C	Mar. 29 to May 5	Shad.
* Weldon, N. C	Apr. 4 to May 16	Striped bass.
* Erwin, Tenn	Entire year	Brook and rainbow trouts; large-mouth and small-mouth black basses, rock bass, sunfish, and catfish.
* Fish Lakes, Washington, D. C	do	Large-mouth black bass and crappie.
* Gloucester, Mass	do	Cod, flatfish, pollock, and lobster.
§ Beachmont, Mass	Apr. 1 to June 30	Lobster.
§ Beverly, Mass	do	Do.
§ Boston, Mass	July 1 to July 10 and Apr. 1 to June 30	Do.
§ Hull, Mass	do	Do.
§ Kittery Point, Me	July 1 to July 10 and Nov. 15 to June 30	Cod, pollock, and lobster.
§ Marblehead, Mass	Apr. 1 to June 30	Lobster
§ Portsmouth, N. H	July 1 to July 10 and Apr. 1 to June 30.	Do.
§ Rockport, Mass	July 1 to July 10 and Nov. 15 to June 30.	Cod, pollock, and lobster.
§ Salt Island, Mass	July 1 to July 10 and Apr. 1 to June 30.	Lobster.
§ York Harbor, Me	do	Do.
* Green Lake, Me	Entire year	Landlocked salmon and brook trout.
§ Branch Pond, Me	Sept. 1 to Nov. 26	Do.
* Grand Lake Stream, Me	Sept. 1 to June 30	Landlocked salmon.
* Leadville, Colo	Entire year	Blackspotted, brook, and rainbow trout.
§ Alicia, Colo	Oct. 21 to Nov. 4	Brook trout.
§ Derry's Lake, Colo	Nov. 9 to Nov. 19	Do.
§ Lake Edith, Colo	Oct. 28 to Nov. 6	Do.
§ Lake Eldora, Colo	Oct. 30 to Nov. 17	Do.
* Grand Mesa Lakes, Colo	July 1 to Aug. 20 and June 1 to June 30.	Blackspotted trout.
* Grand Lake, Colo	Aug. 10 to Sept. 5	Do.
§ Gunnison River, Colo	Apr. 10 to May 31	Rainbow trout.
§ Leo, Colo	Feb. 26 to Mar. 6 and Nov. 21 to Nov. 29.	Brook and rainbow trouts.
§ Musgrove, Colo	Sept. 20 to Nov. 30	Brook trout.
§ Lake San Cristobal, Colo	Apr. 20 to May 20	Rainbow trout.
§ Smith's Lake, Colo	Oct. 19 to Nov. 29	Brook trout.
§ Wellington, Colo	Oct. 28 to Nov. 29	Do.
§ Zoeble's Lake, Colo	Oct. 22 to Nov. 10	Do.
* Mammoth Spring, Ark	Oct. 1 to June 30	Large-mouth black bass.
* Manchester, Iowa	Entire year	Brook, rainbow, blackspotted, lake, and steel-head trouts; quinnat and landlocked salmons; rock bass and yellow perch.
† Bellevue, Iowa [a]	July 11 to Oct. 31	Large-mouth black bass, crappie, catfish, yellow perch, sunfish, pike and pickerel, and buffalofish.
† North McGregor, Iowa [a]	July 17 to Oct. 31	Do.
* Nashua, N. H	Entire year	Brook, rainbow, lake, hybrid, golden and steelhead trouts; landlocked salmon.
§ Sunapee Lake, N. H	Sept. 15 to Nov. 21	Brook and golden trouts; landlocked salmon.
* Neosho, Mo	Entire year	Rainbow, brook, and steelhead trouts; landlocked and quinnat salmons; grayling, large-mouth black bass, rock bass, crappie, and strawberry bass.
* Northville, Mich	do	Lake, brook, rainbow, and steelhead trouts; small-mouth black bass.
* Alpena, Mich	Feb. 28 to June 30	Lake trout and white-fish.
§ Bay City, Mich	Apr. 6 to May 2	Pike perch.
§ Beaver Island, Mich	Oct. 29 to Nov. 25	Lake trout.
§ Belle Isle, Mich	Oct. 20 to Dec. 6	Whitefish.
* Charlevoix, Mich	Mar. 1 to May 3	Lake trout and whitefish.
* Detroit, Mich	Entire year	Whitefish and pike perch.

[a] The steamer *Curlew* is operated on the Mississippi River for the rescue of fishes from the overflowed lands on both sides of the river from Savanna, Ill., to Lynxville, Wis. Bellevue and North McGregor are stations for retaining and distributing fishes thus secured which are not planted in the river.

STATIONS AND SUBSTATIONS OPERATED IN 1905—Continued.

Name and location.	Period of operation.	Fishes handled.
Northville, Mich.—Continued.		
§ Fairport, Mich	Oct. 25 to Nov. 22	Lake trout.
§ Grassy Island, Mich	Oct. 26 to Nov. 30	Whitefish.
§ Manistique, Mich	Oct. 23 to Nov. 23	Lake trout.
§ Ojibwa, Ontario	Nov. 4 to Nov. 24	Whitefish.
§ Roberts Landing, Mich	May 3 to May 29	Pike perch.
* Sault Ste. Marie, Mich	Feb. 1 to June 20	Lake trout and whitefish.
* Put-in-Bay, Ohio	Entire year	Whitefish, lake trout, and lake herring, pike perch.
§ Kelleys Island, Ohio	Nov. 16 to Nov. 30	Whitefish.
§ Middle Bass, Ohio	Nov. 15 to Nov. 30	Do.
§ Monroe, Mich	Nov. 2 to Dec. 2 and Apr. 4 to Apr. 30.	Whitefish and pike perch.
§ North Bass, Ohio	Nov. 13 to Dec. 1	Whitefish.
§ Pelee Island, Ontario	Nov. 15 to Nov. 30	Whitefish and lake herring.
§ Port Clinton, Ohio	Nov. 1 to Nov. 30 and Apr. 6 to Apr. 30.	Whitefish and pike perch.
§ Toledo, Ohio	Apr. 1 to Apr. 30	Pike perch.
Quincy, Ill	Entire year	(Office headquarters.)
† Meredosia, Ill.[a]	July 1 to Nov. 30 and Mar. 1 to June 30.	Large-mouth black bass, crappie, sunfish, yellow perch, catfish, and carp.
* St. Johnsbury, Vt	Entire year	Brook, lake, rainbow, and steelhead trouts; landlocked salmon, and small-mouth black bass.
§ Darling Pond, Vt	Sept. 7 to Dec. 22	Brook trout.
§ Lake Mansfield, Vt	Sept. 13 to Dec. 15	Do.
§ Lake Mitchell, Vt	Sept. 9 to Jan. 3	Do.
* Swanton, Vt	Mar. 1 to May 24	Pike perch and yellow perch.
* San Marcos, Tex	Entire year	Large-mouth black bass, strawberry bass, rock bass, sunfish, crappie, and catfish.
* Spearfish, S. Dak	do	Loch Leven, brook, rainbow and black-spotted trouts.
* West Thumb, Yellowstone Park.	May 20 to Aug. 10	Blackspotted trout.
* Tupelo, Miss	Entire year	Large-mouth black bass, strawberry bass, crappie, and sunfish.
* White Sulphur Springs, W. Va	do	Brook and rainbow trouts; small-mouth black bass.
* Woods Hole, Mass	do	Cod, flatfish, lobster, and tautog.
§ East Greenwich, R. I	Mar. 13 to Apr. 12	Flatfish.
§ Noank, Conn	May 6 to June 30	Lobster.
§ Plymouth, Mass	Nov. 21 to Mar. 21	Cod.
§ Waquoit, Mass	Mar. 20 to Apr. 8	Flatfish.
* Wytheville, Va	Entire year	Brook and rainbow trouts; large-mouth black bass, small mouth black bass, and rock bass.

[a] The State Fish Commission steamer *Illinois* was operated on the Illinois River for the rescue of fishes from the overflowed lands on both sides of the river at points not otherwise covered from Meredosia. The launch *Egret* was used for making collections covering a distance of 10 to 12 miles above and below Meredosia. Meredosia is a station for retaining and distributing fishes thus secured which are not planted in the river.

The following table shows the distribution of fish and eggs by stations. In some instances a portion of the stock of a station was transferred to another station to be hatched or reared and distributed. In such cases the transferred stock is credited in the table to the station from which it was actually distributed. That each station may have due credit for its total product, however, footnotes have been added to explain the transfers.

OUTPUT OF FISH AND EGGS BY STATIONS.

Source of supply.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Baird, Cal	Quinnat salmon	8,661,510	7,561,380	
	Golden trout			269
Battle Creek (substation), Cal.[a]	Quinnat salmon	50,644,800		
Mill Creek (substation), Cal	do	36,719,465		
Baker Lake, Wash.[a]	do		72,798	
	Silver salmon		5,629,895	
	Blueback salmon		7,819,281	10,000
	Steelhead trout	14,400	3,205	
Birdsview (substation), Wash.[a]	Quinnat salmon		96,760	
	Silver salmon	107,000	2,441,186	
	Steelhead trout	100,000		
Battery, Md	Shad		6,834,000	
	White perch	700,000	23,700,000	
	Yellow perch	5,000,000	89,607,149	
Boothbay Harbor, Me	Cod		47,105,000	
	Lobster		81,518,000	
Bozeman, Mont	Steelhead trout			25,000
	Rainbow trout			20,200
	Blackspotted trout	100,000		777,500
	Brook trout			120,000
	Lake trout			2,000
	Grayling	400,000	450,000	
	Whitefish		800,000	
Bryans Point, Md.[a]	Shad		18,313,000	
	Yellow perch		43,881,000	
Cape Vincent, N. Y	Steelhead trout		24,700	
	Brook trout		775,540	
	Lake trout		4,876,000	
	Landlocked salmon		4,800	
	Whitefish		21,000,000	
	Pike perch		6,500,000	
Central Station, D. C	Shad		538,000	
	Brook trout		29,500	
	Silver salmon		4,600	
	Whitefish		445,000	
	Yellow perch		1,105,000	
	Pike perch		950,000	
Clackamas, Oreg	Quinnat salmon	15,000	4,006,779	
	Landlocked salmon		3,000	
	Steelhead trout		3,000	
	Rainbow trout		22,075	
	Brook trout		10,450	
	Lake trout		12,500	
Grants Pass (substation), Oreg.[a]	Silver salmon		1,218,842	
	Steelhead trout		101,000	
Little White Salmon (substation), Wash.	Quinnat salmon		2,138,500	
Big White Salmon (substation, Wash.)	do		1,928,214	
Rogue River (substation), Oreg.[a]	do		4,740,653	
	Silver salmon		31,590	
	Steelhead trout	25,000	430,000	
	Rainbow trout		5,585	
	Blackspotted trout		26,205	3,285
Upper Clackamas (substation), Oreg.	Quinnat salmon	15,000	1,075,204	
Willamette (substation), Oreg.	Blackspotted trout		15,000	
Cold Springs, Ga	Large-mouth black bass			155,150
	Small-mouth black bass			200
	Strawberry bass			190
	Warmouth bass			2,200
	Sunfish			20,750
	Catfish			829
Craig Brook, Me	Landlocked salmon			1,996
	Atlantic salmon	8,000	727,462	289,188
	Silver salmon		1,307,787	
	Steelhead trout			8,740

[a] In addition to the above the following transfers were made:
From Battle Creek to Baird, 5,993,900 quinnat salmon eggs.
From Baker Lake to Birdsview, 10,000 blueback salmon fry.
From Birdsview to other stations, 300,000 steelhead trout eggs.
From Bryans Point to Central Station, 182,000 shad eggs and 1,300,000 yellow perch eggs.
From Grants Pass to Clackamas, 10,000 steelhead trout eggs.
From Rogue River to Cape Vincent, 25,000 steelhead trout eggs.

OUTPUT OF FISH AND EGGS BY STATIONS—Continued.

Source of supply.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Craig Brook, Me	Rainbow trout			1,207
	Brook trout		529,196	55,843
	Lake trout		42,400	
	Scotch sea trout			3,479
Delaware River, Torresdale, Pa.[a]	Shad	378,000	3,326,000	
Duluth, Minn	Landlocked salmon		4,903	
	Steelhead trout		45,000	
	Brook trout		117,000	
	Lake trout	774,000	8,139,000	
	Whitefish		24,860,000	
	Bluefin whitefish	380,000	1,000,000	
	Pike perch		4,100,000	
Edenton, N. C	Shad		3,848,000	
Weldon (substation), N. C	Striped bass		2,463,000	
Erwin, Tenn	Rainbow trout		36,750	123,121
	Brook trout		19,250	53,757
	Large-mouth black bass			32,516
	Small-mouth black bass			6,938
	Crappie			600
	Rock bass			1,883
	Sunfish			11,450
Fish Lakes, D. C	Large-mouth black bass			55,855
	Crappie			5,373
Gloucester, Mass	Cod		68,578,000	
	Flatfish		150,881,000	
	Pollock		8,456,000	
	Lobster		21,680,000	
Green Lake, Me.[a]	Landlocked salmon	192,000	242,011	122,081
	Rainbow trout			20,545
	Brook trout		719,000	2,053
Leadville, Colo.[a]	Steelhead trout			3,550
	Rainbow trout	95,000	11,000	8,340
	Blackspotted trout	165,000		4,045,104
	Brook trout	385,000	2,690,300	532,981
	Lake trout			1,900
	Landlocked salmon			50
Mammoth Spring, Ark	Large-mouth black bass			7,000
Manchester, Iowa[a]	Steelhead trout			2,255
	Rainbow trout	89,000	85,000	45,384
	Brook trout		275,000	68,031
	Blackspotted trout			642
	Loch Leven trout			250
	Lake trout			2,210
	Quinnat salmon			2,150
	Landlocked salmon			75
	Rock bass			8,075
	Yellow perch		25,000	
Bellevue (substation), Iowa	Large-mouth black bass			175,825
	Crappie			625,900
	Sunfish			252,050
	Yellow perch			243,550
	Pike perch			395
	Pike and pickerel			50,000
	Catfish			290,100
	Buffalofish			139,000
North McGregor (substation), Iowa.	Large-mouth black bass			94,896
	Crappie			222,001
	Sunfish			136,280
	Yellow perch			83,200
	Pike and pickerel			12,200
	Catfish			137,505
	Buffalofish			75,000
Nashua, N. H	Landlocked salmon			5,820
	Rainbow trout			13,178
	Brook trout		460,695	89,519
	Lake trout		72,537	
	Steelhead trout		10,000	
	Golden trout		157,490	

[a] In addition to the above the following transfers were made.
From Delaware River, Torresdale, Pa., to Central Station, District of Columbia, 500,000 shad eggs.
From Green Lake to other stations, 70,000 landlocked salmon eggs, 42,000 landlocked salmon fry, and 280,000 brook trout fry
From Leadville to other stations, 195,000 rainbow trout eggs, 970,000 brook trout eggs, and 10,000 blackspotted trout eggs.
From Manchester to other stations, 299,500 rainbow trout eggs.

OUTPUT OF FISH AND EGGS BY STATIONS—Continued.

Source of supply.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Neosho, Mo. [a]	Quinnat salmon			2,975
	Landlocked salmon			40
	Rainbow trout		44,260	32,084
	Steelhead trout			2,240
	Brook trout			20
	Grayling			20
	Large-mouth black bass			22,735
	Crappie			1,225
	Strawberry bass			6,709
	Rock bass			29,110
Northville, Mich. [a]	Steelhead trout		16,000	32
	Rainbow trout		48,000	1,315
	Brook trout		795,000	13,560
	Lake trout	4,546,000	3,475,000	630
	Loch Leven trout			12
	Small-mouth black bass			102,150
Alpena (substation), Mich. [a]	Lake trout		5,039,000	
	Whitefish		25,000,000	
	Pike perch	10,000,000	8,000,000	
Charlevoix (substation), Mich	Lake trout		6,176,000	
	Whitefish		25,000,000	
Detroit (substation), Mich. [a]	do	1,010,000	26,000,000	
	Pike perch	47,400,000	13,000,000	
Sault Ste. Marie (substation), Mich.	Lake trout		7,144,000	
	Whitefish		25,000,000	
Put-in Bay, Ohio [a]	do	59,953,000	120,300,000	
	Lake trout		913,000	
	Lake herring	87,040,000	35,000,000	
	Pike perch	88,350,000	153,700,000	
Quincy, Ill. (Meredosia station)	Large-mouth black bass			14,400
	Crappie			500
	Sunfish			1,350
St. Johnsbury, Vt. [a]	Landlocked salmon		20,290	430
	Steelhead trout		3,000	9,930
	Rainbow trout			1,150
	Brook trout	71,000	1,146,200	
	Lake trout		178,829	4,755
	Small-mouth black bass			3,929
Swanton (substation), Vt. [a]	Pike perch	7,000,000	59,898,875	
	Yellow perch		4,834,372	
San Marcos, Tex	Large-mouth black bass			102,255
	Crappie			5,163
	Strawberry bass			400
	Rock bass			12,370
	Sunfish			8,970
	Catfish			275
Spearfish, S. Dak. [a]	Rainbow trout		37,500	
	Blackspotted trout	40,000		1,566,500
	Brook trout		730,000	60,000
	Loch Leven trout		27,000	1,800
Tupelo, Miss	Large-mouth black bass			13,350
	Crappie			1,337
	Strawberry bass			2,859
	Sunfish			19,200
White Sulphur Springs, W. Va	Rainbow trout		20,000	17,050
	Brook trout		725,000	34,850
	Small-mouth black bass			67,550
Woods Hole, Mass	Cod		53,894,000	
	Flatfish		52,475,000	
	Lobster		13,016,000	
	Tautog		2,983,000	
Wytheville, Va. [a]	Catfish			23
	Rainbow trout	102,000	138,300	65,500
	Brook trout		6,000	59,150
	Large-mouth black bass			59,775
	Small-mouth black bass			11,445
	Rock bass			16,905

[a] In addition to the above, the following transfers were made:
From Neosho to other stations, 302,300 rainbow trout eggs.
From Northville to other stations, 28,224,800 lake trout eggs.
From Alpena to Duluth, 5,000,000 pike perch eggs.
From Detroit to other stations, 100,500,000 whitefish eggs.
From Put-in Bay to other stations, 30,920,000 whitefish eggs and 10,000,000 pike perch eggs.
From St. Johnsbury to other stations, 135,000 brook trout eggs and 75,430 brook trout fry.
From Swanton to other stations, 12,000,000 pike perch eggs.
From Spearfish to Bozeman, 400,000 blackspotted trout eggs.
From Wytheville to other stations, 200,000 rainbow trout eggs.

THE DISTRIBUTION.

The first consideration in the distribution of the product of the hatcheries is to make ample return to the waters from which eggs have been collected. The remainder of the fish are sent to applicants throughout the country for stocking state waters, fishing preserves, private ponds and streams, etc., and are delivered free of charge to the applicant, at the railroad station nearest the point of deposit. In 1905, 4,908 such applications were received, an increase of 15 per cent over the previous year, and a demand so far in excess of the resources of the Bureau that many applications had to be continued on file, to be filled from the succeeding year's stock. The output especially of black bass (both large-mouth and small-mouth), crappie, and the catfishes was inadequate, although many more of these fishes were produced in 1905 than in any previous year.

Fishes are distributed at various stages of development, according to the species, the numbers in the hatcheries, and the facilities for rearing. The commercial fishes, such as the shad, whitefish, lake trout, pike perch, cod, etc., which are hatched in lots of many million, are necessarily planted as fry; it is customary to distribute them just before the umbilical sac is completely absorbed. Atlantic salmon, landlocked salmon, and various species of trout in such numbers as the hatchery facilities permit are reared to fingerlings from 1 to 6 inches in length; the balance are distributed as fry. The basses and sunfishes reared at fish-cultural stations are distributed from the time the young rise from the spawning beds until they have reached such size as makes it impracticable to feed them in the hatcheries; the last lots distributed are usually of fish 3 to 5 inches in length. The numerous kinds of fishes collected in overflowed lands—basses, crappie, sunfishes, pike and pickerel, catfishes, yellow perch, buffalofish, and others—are 2 to 6 inches in length when taken and distributed. Eggs are distributed only to state hatcheries or to applicants who have facilities for hatching them.

The difference in methods of hatching applicable to the different species is a determining factor in the supply of particular fishes available for distribution, and consequently of the number allotted to individual applicants. The area and character of the water to be stocked must likewise be considered, for the same water area which would receive a million pike perch fry would perhaps be assigned no more than 200 or 300 black bass 3 or 4 inches long, or four to eight times that many if the bass were planted as fry. The explanation is in the fact that pike perch can be propagated by the hundred million, while black bass, hatched by other methods or collected from overflowed lands, can be produced only in comparatively small numbers. The Bureau does not attempt to assign any applicant more

than a liberal brood stock of the basses or sunfishes. With brook trout, which are distributed both as fry and fingerlings, assignments of fry are twenty-five to fifty times larger than assignments of fingerlings 3 to 4 inches long.

The following tabulation shows, by species and waters stocked, all distributions of fish and eggs during the year ended June 30, 1905. The waters are grouped according to states and localities, which are arranged in alphabetical order, with the exception of assignments to foreign governments. A total of 1,756,000 eggs was shipped to the governments of Argentina and New Zealand.

Details of Distribution.

Species and disposition.	Fingerlings, yearlings, and adults.
Catfish.	
Arizona:	
Benson, Days Pond	100
Silver Pond	100
Hillside, Shipps Lake	75
Jerome, Chick Slough	125
Oak Creek Pond	100
Pecks Lake	75
Verde River	200
Tucson, pond	75
Georgia:	
Bullochville, Parhams Pond	37
Columbus, Garrards Pond	100
Haddock, Roberts Pond	125
Hamilton, pond	117
Ochillee, Harp Mill Pond	125
Shiloh, Crofford Spring Pond	100
Thomaston, Barron Pond	125
Waverly Hall, pond	100
Idaho:	
Culdesac, pond	100
Genesee, artificial pond	100
Brighams Lake	150
pond	100
Illinois:	
Alto Pass, ponds (2)	200
Benton, railroad pond	100
Blanding, Mississippi River	30,000
Casey, Fairview Lakes	100
East Dubuque, Mississippi River	20,000
Elkhart, Hunter Pond	100
Galena, Mississippi River	45,000
Savanna, Mississippi River	30,000
Indiana:	
Angola, Center Lake	250
Chambers Lake	100
Ewers Pond	150
Fox Lake	250
Loon Lake	250
Boonville, Fairview Lake	100
Boston, Star Pond	100
Culver, Lake Maxinkuckee	5,700
Lebanon, gravel pit pond	100
Osceola, pond	200
Pleasant Lake, Golden Lake	250
Indian Territory:	
Grove, Spring Creek	88
Iowa:	
Bellevue, Mississippi River	40,000
Calmar, Big Turkey River	600
Charles City, Cedar River	1,800
Chester, Upper Iowa River	1,200
Clayton, Mississippi River	20,000
Dubuque, Mississippi River	25,000
Fairfield, City Waterworks Reservoir	4,500
Gordons Ferry, Mississippi River	45,000
Green Island, Mississippi River	10,000
Iowa Falls, Iowa River	7,800
Catfish—Continued.	
Iowa—Continued.	
Lainsville, Mississippi River	10,000
Manchester, Maquoketa River	6,000
North McGregor, Mississippi River	25,000
Smith Ferry, Mississippi River	20,000
Wadena, Volga River	2,700
Waterloo, Cedar River	4,000
Winthrop, Wapsipinicon River	3,000
Kansas:	
Arkalon, lake	75
Atchison, Sulphur Springs Lake	100
Burrton, Bendenbough Pond	75
pond	100
Circleville, pond	75
Codell, Stockwood Creek	120
Colby, pond	200
Coldwater, pond	100
Columbus, Statons Pond	75
Ellis, Big Creek Dam	75
Eureka, pond	150
Everest, Hegendeffer Pond	75
Garden City, pond	75
Renick Pond	75
Harper, Dotterers Pond	200
Hays City, ponds (5)	225
Hill City, pond	100
Kensington, East Cedar Pond	100
Kinsley, Parker Pond	75
Lakin, pond	75
Leoti, Beaver Creek Pond	150
Mankato, Rock Island Pond	50
Mineral, Ryans Pond	150
Munden, pond	125
Ness City, Sunset Lake and Walnut Creek	200
Osage City, Welsh Lake	100
Phillipsburg, Crystal Lake	100
Scandia, pond	50
Shields, reservoir	75
Washington, pond	75
Wellington, Slate Creek	200
Kentucky:	
Burgin, Cedar Creek Pond	100
Franklin, Red Pond	150
Jackson, Kentucky River	200
Paris, Muir Pond	100
Turners, Barnett Pond	100
Michigan:	
Iron River, Eastman Lake	150
Newaygo, Twin Lake	200
Mississippi:	
Centerville, pond	100
Magee, Burnhams Pond	100
Newton, pond	150
Missouri:	
Carthage, pond	75
Deepwater, tile factory pond	100
Hermann, pond	100

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Catfish—Continued.	
Missouri—Continued.	
Mendota, pond	100
Pomona, pond	100
Walnut Grove, Toalson Pond	75
Nebraska:	
Albion, Beaver River	400
Max, Rose Pond	200
Valley, Woodworths Lake	200
Verdon, Wardens Lake	75
New Mexico:	
Albuquerque, pond	100
reservoir	100
Columbus, Nesquit Pond	280
Deming, Currys Pond	100
Taylors Pond	100
Dorsey, pond	100
Florida, pond	130
Lordsburg, pond	100
Hart Ranch Pond	150
Nutt, ponds (3)	390
Portales, Bushongs Pond	100
ponds (2)	200
Millers Pond	100
Grand Tank	100
Silver City, Barnes Pond	130
North Dakota:	
Devils Lake, Devils Lake	300
Larimore, Harts Pond	150
Ohio:	
Dayton, Soldiers Home Lake	305
Euclid, Pollywogrun Pond	150
Jerusalem, Mann Pond	100
Maria Stein, pond	100
Marietta, Ohio River	200
Montpelier, Faith Pond	100
pond	100
Oklahoma:	
Cache, pond	100
Edmond, Houchens Pond	100
Elgin, ponds (2)	200
Guthrie, pond	150
Hunter, Fishers Pond	100
Lawton, pond	100
Mulhall, Kent Pond	100
ponds (3)	350
Okarche, ponds (2)	150
O Keene, pond	150
Piedmont, pond	100
Ripley, Pickerill Resort Pond	250
Wellston, pond	75
Woodward, Spring Lake	100
Oregon:	
Ashland, Buck Lake	410
Oswego, Sucker Lake	300
Pennsylvania:	
Rowland, Burchew Pond	200
Scranton, Cobbs Lake	150
Moosic Lake	200
Mud Pond	200

Species and disposition.	Fingerlings, yearlings, and adults.
Catfish—Continued.	
South Dakota:	
Glenham, Elkhorn Creek	200
Loyalton, ponds (2)	350
Seneca, Lester Pond	200
White Lake, Nelsons Lake	300
Texas:	
Brownsboro, pond	20
Canyon City, Terra Blanca Creek	75
Channing, Pount Deaugh Creek	50
Dalhart, pond	10
Hereford, ponds (2)	25
Locust Grove Lake	10
Italy, Williams Pond	10
Middle Water, Boyce Pond	10
pond	10
San Antonio, San Antonio River	20
Summerfield, Roberson Pond	10
Waco, Payne Pond	20
Virginia:	
Abingdon, Middle Pond	75
Charlottesville, Ravanna River	75
Glasgow, Mathews Pond	100
Wytheville, Reed Creek	23
Washington:	
Addy, Duck Lake	150
Arlington, pond	150
Elma, Kinwamans Lake	200
Wisconsin:	
Cassville, Mississippi River	10,000
Glenhaven, Mississippi River	20,000
Lynxville, Mississippi River	20,000
Wyoming:	
Walcott, Rosander Reservoir	200
Total [a]	427,425
Buffalofish.	
Illinois:	
Blanding, Mississippi River	5,000
East Dubuque, Mississippi River	10,000
Savanna, Mississippi River	23,000
Iowa:	
Bellevue, Mississippi River	22,000
Clayton, Mississippi River	15,000
Dubuque, Mississippi River	5,000
Gordons Ferry, Mississippi River	50,000
Green Island, Mississippi River	7,000
Lainsville, Mississippi River	10,000
North McGregor, Mississippi River	15,000
Smith Ferry, Mississippi River	12,000
Wisconsin:	
Cassville, Mississippi River	5,000
Glenhaven, Mississippi River	20,000
Lynxville, Mississippi River	15,000
Total	214,000

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Shad.			
Connecticut:			
Connecticut Fish Commission, Joshuatown retaining ponds		1,239,000	
District of Columbia:			
Off Fish Lakes, Potomac River		538,000	
Maryland:			
Maryland Fish Commission, Chesapeake Bay		2,499,000	
mouth of Susquehanna River		2,499,000	

[a] There were lost in transit 1,307 catfish.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Shad—Continued.			
Maryland—Continued.			
Battery Haul, Chesapeake Bay		795,000	
Western Channel, Chesapeake Bay		500,000	
Western Flats, Chesapeake Bay		541,000	
Off Broad Creek, Potomac River		2,357,000	
Off Bryans Point, Potomac River		935,000	
Off Pamunky Creek, Potomac River		1,115,000	
Off Piscataway Creek, Potomac River		1,822,000	
Off Swan Creek, Potomac River		2,031,000	
New Jersey:			
New Jersey Fish Commission, State waters		3,256,000	
North Carolina:			
Avoca, Salmon Creek		972,000	
Cherry Point, Edenton Bay		299,000	
Hornblowers Point, Albemarle Sound		420,000	
Newbern, Neuse River		401,000	
Washington, Pamlico River		450,000	
Wilmington, Cape Fear River		400,000	
Pennsylvania:			
Pennsylvania Fish Commission, Torresdale	378,000	70,000	
Virginia:			
Courtland, Nottoway River		466,000	
Franklin, Black Water River		440,000	
Off Dogue Creek, Potomac River		1,899,000	
Off Little Hunting Creek, Potomac River		2,898,000	
Off Occoquan Creek, Potomac River		3,208,000	
Off Pohick Creek, Potomac River		809,000	
Total	378,000	32,859,000	
Whitefish.			
Michigan:			
Belle Isle, Detroit River		25,950,000	
Charlevoix, Lake Michigan		15,000,000	
Detour, Lake Huron		6,000,000	
Fishermans Home, Lake Superior		4,200,000	
Forester, Lake Huron		4,000,000	
Fox Island Reef, Lake Michigan		5,000,000	
Irishmans Reef, Lake Michigan		5,000,000	
Mackinaw, Straits of Mackinac		3,000,000	
Manistique, Lake Michigan		5,000,000	
Marquette, Lake Superior		4,000,000	
Naubinway, Lake Michigan		1,000,000	
North Point, off Thunder Bay		8,500,000	
Ontonagon, Lake Superior		7,000,000	
Point Iroquois, St. Marys River		3,000,000	
Salt Point, Lake Superior		6,000,000	
Scarecrow Island, Lake Huron		9,000,000	
Thunder Bay Island, Lake Huron		3,500,000	
Vandalia, Shavehead Lake		50,000	
Washington Harbor, Lake Superior		2,800,000	
Whitefish Point, Lake Superior		1,000,000	
Minnesota:			
Grand Marais, Lake Superior		2,800,000	
Two Harbors, Lake Superior		1,000,000	
Montana:			
Belton, Lake McDonald		200,000	
Kalispell, Foys Lake		200,000	
Radnor, Stillwater Lake		200,000	
Whitefish, Whitefish Lake		200,000	
New York:			
New York, Battery Park Aquarium	10,000		
Bear Point, Lake Ontario		500,000	
New York Fish Commission, Caledonia	3,000,000		
Cape Vincent, Wilsons Bay		14,000,000	
Fullers Bay		3,000,000	
Cooperstown, Otsego Lake		445,000	
Grenadier Island, Lake Ontario		3,500,000	
Ohio:			
Ballast Island Reef, Lake Erie		10,000,000	
Catawba Island, Lake Erie		8,000,000	
Gull Island Reef, Lake Erie		10,000,000	
Ohio Fish Commission, Lakeside	4,144,000		
Lutes Point, Lake Erie		10,000,000	
Niagara Reef, Lake Erie		10,000,000	
North Bass Island Reef, Lake Erie		20,000,000	
Port Clinton, Lake Erie		20,000,000	
Put-in Bay, Lake Erie		22,300,000	
Starve Island Reef, Lake Erie		10,000,000	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Whitefish—Continued.			
Pennsylvania:			
Pennsylvania Fish Commission, Erie	42,809,000		
Wisconsin:			
Iron River, Lake Superior		2,800,000	
Wisconsin Fish Commission, Oshkosh	10,000,000		
Woodruff, Crooked Lake		260,000	
New Zealand:			
New Zealand Government, Auckland	1,000,000		
Total	60,963,000	268,405,000	
Bluefin whitefish.			
Minnesota:			
Duluth, Lake Superior		1,000,000	
Missouri:			
St. Louis, Louisiana Purchase Exposition	380,000		
Total	380,000	1,000,000	
Lake herring.			
Ohio:			
Kelleys Island, Lake Erie		15,000,000	
Ohio Fish Commission, Lakeside	50,000,000		
Put-in Bay, Lake Erie		20,000,000	
Pennsylvania:			
Pennsylvania Fish Commission, Erie	37,040,000		
Total	87,040,000	35,000,000	
Chinook salmon.			
Arkansas:			
Mammoth Spring, Mammoth Spring			2,140
California:			
Baird, McCloud River		7,561,380	
California Fish Commission, Eel River	8,414,950		
Sisson	87,170,825		
Iowa:			
Spirit Lake, West Okoboji Lake			1,950
Missouri:			
St. Louis, Louisiana Purchase Exposition	70,000		1,035
Oregon:			
Clackamas, Clackamas River		3,543,249	
Spring Branch		448,930	
Portland, Lewis and Clark Exposition		14,600	
Rogue River Station, Elk Creek		2,905,653	
Rogue River		1,835,000	
Upper Clackamas Station, Clackamas River		1,075,204	
Washington:			
Little White Salmon Station, Columbia River		2,582,800	
Little White Salmon River		1,483,914	
Skagit County, Phinney Creek		96,760	
Whatcom County, Hatchery Creek		15,000	
Lower Baker River		57,798	
Argentina:			
Argentine Government, Buenos Ayres	100,000		
New Zealand:			
New Zealand Government, Auckland	300,000		
Total	96,055,775	21,620,288	5,125
Silver salmon.			
Maine:			
Brownville, Penobscot River		228,700	
Bucksport, inlet to Hancock Pond		2,250	
outlet to Jacob Buck Pond		3,750	
Stubbs Brook		6,000	
Cherryfield, Narragaugus River		50,000	
Damariscotta Mills, Damariscotta River		88,000	
Dennysville, Dennys River		125,700	
East Bucksport, Copeland Brook		16,000	
East Orland, Alamoosook Lake		33,738	
Heart Pond		5,000	
Toddy Pond		19,111	
tributary of Patten Pond		10,215	
Ellsworth Falls, Union River		50,236	
Freeport, Spar Creek	2,000		
Newport, Sebasticook River		142,800	
Presque Isle, Aroostook River		88,000	
Saco, Saco River		54,600	
Surry, Toddy Pond		19,587	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Silver salmon—Continued.			
Maine—Continued.			
Union, Seven Tree Pond		10,000	
Vanceboro, St. Croix River		114,700	
Vassalboro, Kennebec River		169,000	
Maine Fish Commission, Winthrop	55,000		
New Hampshire.			
East Rochester, Salmon Falls River		75,000	
New Hampshire Fish Commission, Laconia	50,000		
Oregon:			
Grants Pass, Jones Creek		394,312	
Rogue River		824,530	
Rogue River Station, Elk Creek		31,590	
Washington:			
Skagit County, Grandy Creek		945,173	
Phinney Creek		1,496,013	
Whatcom County, Lower Baker River		5,629,895	
Total	107,000	10,633,900	
Blueback salmon.			
Washington:			
Whatcom County, Lower Baker River		7,819,281	10,000
Steelhead trout.			
Arkansas:			
Mammoth Spring, Mammoth Spring			1,840
Colorado:			
Leadville, Middle Evergreen Lake			1,000
Upper Evergreen Lake			50
Iowa:			
Forest City, Shell Rock River			700
Maine:			
Augusta, Lake Cobbosseecontee			4,370
Rockland, Moody Pond			4,370
Michigan:			
Detroit, park pond			12
Negaunee, Cleveland Cliffs Iron Company	50,000		
Paris, Muskegon River		16,000	
Minnesota:			
Duluth, French River			870
Lester River		15,000	400
Fergus Falls, Anna Lake		10,000	
Long Lake		10,000	
Klondike, Crocker Lake		10,000	
Missouri:			
St. Louis, Louisiana Purchase Exposition			596
Montana:			
Bozeman, Spanish Creek			4,000
Divide, Big Hole River			8,000
Missoula, Bitter Root River			8,000
Toston, Crow Creek			5,000
Nevada:			
Battle Mountain, Humboldt River			2,500
New Hampshire:			
Enfield, Crystal Lake		10,000	
New York:			
Long Lake West, Wolf Pond		24,700	
Oregon:			
Grants Pass, Rogue River		34,000	
Portland, Lewis and Clark Exposition	50,000	3,000	
Rogue River Station, Elk Creek		430,000	
Tolo, Rogue River		67,000	
Vermont:			
Barton, Crystal Lake			4,965
Swanton, Dioms Brook		3,000	
Westmore, Willoughby Lake			4,965
Washington:			
Hamilton, Carys Lake	14,400	3,205	
Wyoming:			
Wyoming Fish Commission, Ranchester	25,000		
Total [a]	139,400	635,905	51,638

[a] 109 yearling steelhead trout were lost in transit.

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DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Rainbow trout.			
Alabama:			
Perdido, Havards Pond			390
Arizona:			
Flagstaff, Live Oak Creek			775
West Fork of Live Oak Creek			775
Jerome, Beaver Creek			925
Clear Creek			925
Oak Creek			775
Sycamore Creek			775
Arkansas:			
Beaver, Leatherwood Creek		5,000	
Bentonville, pond			300
Eureka Springs, Blue Spring		5,000	
Fordyce, pond			800
Greenwood, Vache Gras River			2,000
Mammoth Spring, Mammoth Spring			3,200
Mena, Mena Park Lake		10,000	
Ouachita River			1,972
Monte Ne, Monte Ne Lake		10,000	
Colorado:			
Glenwood Springs, pond			20
Granite, McFadden Lake			2,000
Salida, Ridgway Pond		11,000	
Delaware:			
Delaware Fish Commission, Wilmington			1,000
Georgia:			
Blue Ridge, Weavers Creek			1,500
Cornelia, Hazel Creek			2,300
Crawfordville, Moores Mill Pond			600
Ellijay, Smiths Pond			200
Gainesville, Woodys Pond			500
Grovetown, pond			200
Kensington, Mill Creek			540
Wiley, West Branch of Tiger Creek			800
Idaho:			
Blackfoot, Branch of Boon Creek			400
Hope, Gamblin Lake			1,000
Mackay, S. I. Shaw	5,000		
Montpelier, Grove Lake			600
Pebble, Willow Leaf Pond			200
Shoshone, Little Wood River			1,200
Indiana:			
Burket, Fruit Creek		7,000	
Fairmount, Winslows Pond		4,000	
Indian Territory:			
Ardmore, Winans Mill Pond			300
Iowa:			
Chester, Etna Creek			4,000
Forestville, Maquoketa River		10,000	5,740
Harpers Ferry, Bolger Cooley Creek		5,000	
Lansing, Village Creek			5,000
McGregor, Spring Creek		5,000	
Manchester, Honey Creek		5,000	
Spring Branch			600
Mason City, Shell Rock River			5,000
North McGregor, Spring Creek		5,000	
Waukon, Duck Creek		7,000	
North Fork Creek		5,000	
Paint Creek			5,000
Spring Branch		5,000	
Village Creek		27,000	
Waterloo Creek		7,000	
Kansas:			
Hutchinson, Cow Creek			1,000
Kentucky:			
Hopkinsville, East Fork of Little River			1,500
Sinking Fork of Little River			1,500
Maine:			
East Orland, Alamoosook Lake			1,207
Monmouth, Lake Cobbosseecontee			2,000
Otis, Green Lake			18,545
Maryland:			
Maryland Fish Commission, Baltimore	38,000		
Deer Park, North Blade Creek			800
Glyndon, Lake Jorosa			300
Hagerstown, Marsh Run			800
Hoods Mills, Hammonds Ice Pond			300
Jessups, lake			200
Oakland, Marsh Run			300
Rocky Ridge, Owens Creek			1,000

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Rainbow trout—Continued.			
Massachusetts:			
Cushman, Cranberry Lake			1,500
Grafton, Kittville Pond			1,000
Lynn, Rhoedon Lake			1,500
Saundersville, Dorothy Brook			1,000
State Line, State Line Brook			1,000
Wilmington, Silver Lake			1,500
Worcester, Agricultural Society Pond			28
Michigan:			
Alanson, Spring Brook		7,000	
Brighton, Birds Creek		7,000	
Ore Creek			300
Hillsdale, Cold Springs Pond			212
Mill Creek, Mill Creek			298
Northville, De Kay Creek		5,000	
Rouge Creek			100
Somerset, Smiths Pond			300
Sparta, Camp Lake		8,000	
Watersmeet, Loon Lake		10,000	
Minnesota:			
Little Falls, Swan River			2,000
Mississippi:			
Corinth, Moore Lake			555
Missouri:			
Anderson, pond			400
Arlington, Gasconade River			1,125
Bourbon, Meramec River			1,125
Brookline, McLaughlin Pond			300
Crocker, Gasconade River			1,125
Fanning, August Lauth	10,000		
Joplin, pond			200
Leasburg, Meramec River			1,125
Marshfield, Osage River			1,125
Monett, reservoir		2,800	
Moselle, Meramec River			1,125
Neosho, McMahons Springs		1,260	283
ponds (2)			260
Newburg, Little Piney River			1,200
Niangua, Osage Fork River			1,125
Platte City, Rock Spring Lake		5,000	
Robertsville, Meramec River			1,125
Springfield, Spring Creek			300
St. Louis, Louisiana Purchase Exposition			168
Stanton, Meramec River			1,125
Warrensburg, Roseland Pond		3,000	
Montana:			
Bonita, Rock Creek			1,200
Dillon, Black Tail Deer Creek			1,500
Boatman Lake			1,000
Boot Lake			1,000
Esler Lake			1,000
Left Fork of Black Tail Deer Creek			1,200
Pear Lake			1,200
Elliston, Little Blackfoot Creek			1,200
Kalispell, Millers Creek			1,200
Lewistown, Beaver Creek			800
Lothrop, Pattee Creek			1,200
Missoula, Rattlesnake Creek			1,000
Pony, South Willow Creek			1,200
Sheridan, Bradleys Lake			1,000
Silver Bow, Ericksons Pond			300
Toston, Spring Creek Lake			800
Nebraska:			
Imperial, Cunninghams Pond			1,000
Kilpatrick Lake			2,000
Nebraska Fish Commission, South Bend, Big Sandy Creek			10,000
South Bend	41,000		
Zell, trout pond			1,000
Nevada:			
Elko, Humboldt River			2,500
New Hampshire:			
Sugar Hill, Star Crescent Pond			400
Warren, Bakers River			2,000
Wentworth, Bakers River			1,500
New Jersey:			
Belvidere, Montalena Pond			400
Gallia, pond			400
Netcong, Barbosa Brook			800
Ramseys, trout brook			700

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Rainbow trout—Continued.			
New Mexico:			
Cloudcroft, Hendrix Reservoir			300
Las Vegas, Trout Springs			800
New York:			
New York, Battery Park Aquarium	10,000		
Poughkeepsie, Vassar College Brook			800
North Carolina:			
Balsam, Fork of Balsam Creek			600
Rickards Pool			200
Boonford, tributaries of Toe River			6,000
Bostic, Huntington Creek			800
Brevard, Allison Lake			500
Cedar Rock Creek			800
Bushnell, Forney Creek			2,000
Clyde, Cataloochee Creek			1,500
Elk Park, Cane Creek		3,715	
Salem Mission Pond			200
Fletcher, Cain Creek			1,500
Hendersonville, Green River			4,000
Hungry Creek			800
Upper Hungry Creek			800
Horseshoe, French Broad River		8,100	2,000
Shaws Creek			800
Huntdale, Cane Creek			1,500
Lenoir, Rainbow Pond			500
Marion, Harbins Lake			500
Morgans Pond			500
Toms Creek			800
Mast, Cone Creek		8,000	
Melrose, Mill Creek		8,100	
North Pacolet River			800
Morrisville, Sycamore Creek			400
Penland, Toe River		15,000	
Raleigh, Batts fish pond			500
Penitentiary Lake			500
Rutherfordton, Cove Creek		8,100	
Spruce Pine, Grassy Creek			800
Toxaway, Flat Creek			800
Middle Fork French Broad River			2,000
Tryon, Alstons Creek			800
Spring Creek			500
Waterville, Big Creek			1,500
Waynesville, Bald Creek			600
Campbells Creek			600
Cataloochee Creek			500
Cherry Cone Creek			600
Deep Gap Creek			600
Hemphill Creek			600
Jonathan Creek			1,500
Massey Fork Creek			600
Platt Creek			600
Shiney Creek			900
Slestatchee Creek			600
Willetts, Scotts Creek			1,000
Zirconia, Green River		9,000	2,000
North Dakota:			
New Salem, Spring Brook Pond			1,000
Oklahoma:			
Mangum, Moss Creek			800
Waynoka, Spring Lake			800
Oregon:			
Albany, Yaquina River		3,000	
Cottage Grove, East Fork Willamette River		3,000	
Mosby Creek		3,000	
Row River		3,000	
Portland, Lewis and Clark Exposition	60,000	10,000	75
Rogue River Station, Rogue River		5,585	
Pennsylvania:			
Alexandria, Loop Run			800
Ashland, Shoemaker Creek			500
Bedford, tributary of Bobs Creek			1,000
Belle Vernon, pond			600
Brandonville, Torberts Run			600
Butler, Pine Run			1,200
Canadensis, Middle Branch Creek			800
Stony Run			600
Chambersburg, Falling Spring Creek			600
Columbia Crossroads, Sugar Creek			700
Corry, Pennsylvania Fish Commission	30,000		

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Rainbow trout—Continued.			
Pennsylvania—Continued.			
Coudersport, Clark Spring Brook			300
Dingman Creek			600
Fee Brook			400
Gardiner Spring Brook			300
Gordon Spring Brook			300
Haskell Spring Brook			200
Earl Spring Brook			600
Lent Pond			150
Mehring Brook			600
Nelson Run			600
Reese Hollow Run			600
Spring Brook			1,000
Steer Brook			500
Stellman Spring Brook			400
Terrence Fee Pond			200
Wedsworth Spring Brook			300
Currys Station, Meadow Branch			1,000
Danville, pond			300
Ellwood, Fishing Creek			800
Fern Glen, Big Tomhicken Creek			700
Crooked Run			700
Davis Run			800
Little Tomhicken Creek			700
Roberts Run			800
Rock Glen Run			700
Sand Spring Run			800
Schlanchs Run			800
Singleys Run			600
Gaines Junction, Elk Run			2,500
Galeton, Pine Creek			800
Gold Mine, Gold Mine Creek			600
Jeffs Creek			700
Mount Eagle Creek			500
Good Spring, Rausch Gap Creek			600
Gordon, Little Mahanoy Creek			800
Hamburg, Furnace Creek			800
Renos Creek			800
Pennsylvania Fish Commission, Herrick Center			4,000
Hopewell, Yellow Creek			1,000
Hosensack, Indian Creek			800
Jenkintown, Rogers Lake			200
McCalls Ferry, Tucquan Creek			500
Mahanoy City, Condorrie Creek			500
Head of Locust Creek			500
Kadora Creek			500
mill pond			700
Marietta, Evans Run			1,000
Millerstown, Marsh Run			500
Mountain Home, Goose Pond Run			600
Mount Pocono, Sebrings Pond			300
Timber Creek			600
Newville, Big Run			800
Paint Creek, Clear Shade Creek			1,200
Cub Run			1,200
Dark Shade Creek			1,200
Paint Creek			1,200
Roaring Fork Creek			1,200
Sorrel Run			1,200
Ralston, Rock Run			1,000
Reading, Browns Brook			100
Richmond, Upper Conococheague Creek			1,700
Rising Springs, Laurel Run			1,500
Penns Creek			1,500
Rock, Hering Lake			100
Shocks Mills, Hoffmans Run			600
Tomhicken, Schaars Run			700
Tower City, Clarks Creek			800
Pine Creek			700
Washington, Berks Fish Pond			300
Wingerton, Crystal Lake			300
Woodstock, Conococheague Creek			1,350
York, Gitchezumel Pond			75
Kreidlers Run			400
South Carolina:			
Greenwood, Yoes Spring Branch			500
South Dakota:			
Buffalo Gap, Beaver Creek		10,000	
Nelsons Spring		2,000	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Rainbow trout—Continued.			
South Dakota—Continued.			
Englewood, Elk Creek		3,000	
Gamble, Stanley Creek		3,000	
Hill City, Palmer Creek		4,000	
Spring Creek		4,000	
Oreville, Spring Creek		5,000	
Rochford, Copper Creek		3,000	
Spearfish, Spearfish Creek		500	
Sturgis, Hodgsons Lake		3,000	
Tennessee:			
Algood, Spring Creek			1,000
Ashland City, Sycamore Creek			400
Athens, Bon Ton dairy pond			500
Belfast, pond			200
Clinton, Clinch River			4,620
Elizabethton, Doe River			1,000
Watauga River			1,000
Erwin, McInturff Pond		4,000	500
Fishery, Spring Branch			1,354
Indian Creek			487
Fish Springs, Watauga River			1,000
Franklin, Big Harpeth River			2,000
Greenville, Paint Creek		2,000	
Hampton, Doe River			1,425
Laurel Fork Creek			800
Lower Torrell Creek			800
Simerley Creek			800
Spring Creek			475
Upper Torrell Creek			800
Hunter, Perry Lake			1,000
Stoney Creek			1,000
Johnson City, Soldiers' Home Lake			490
Knoxville, Tennessee River			2,000
Lawrenceburg, Clear Creek			800
Shoal Creek			1,000
Spring Creek			300
McMillan, Holston River			3,000
McMinnville, Sink Creek			1,000
Milligan, Buffalo Creek			1,000
Mountain City, Mill Creek			800
Roan Creek and tributaries			15,260
Silver Lake			3,000
Roan Mountain, Doe River			1,000
Warner, pond			300
Texas:			
Clarendon, Allan Creek			300
Utah:			
Provo, Provo River			2,000
Vermont:			
Barton, Crystal Lake			125
Brattleboro, Bakers Brook			300
Greenes River			300
Marshfield, Onion River			300
Proctor, Beaver Pond			1,250
Pico Pond			500
Sugar Hill, Star Crescent Pond			400
Westmore, Willoughby Lake			125
Virginia:			
Allegheny, Snake Run			2,000
Atkins, Holt Branch Pond			500
Shupe Branch Pond			2,000
Cascade, Cascade Creek		3,000	
Chilhowie, Mill Creek			4,000
Christiansburg, Mountain Stream		5,000	
Damascus, White Top River		10,000	
Duffield, Carters Pond			500
Leesburg, quarry pond			300
Luray, Spring Farm Pond			300
Lynchburg, Orphans Home Branch		5,000	
Marion, Holston River			3,000
Middle Fork Holston River			500
Staleys Creek		10,000	
Martinsville, Smith River		7,000	
Mount Jackson, Smiths Creek		10,000	
Natural Bridge, Cedar Creek		15,000	
Newcastle, Craig Creek Pond		10,000	
Willow Pond		10,000	
Roanoke, Roanoke River		5,000	
Rural Retreat, pond			500

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Rainbow trout—Continued.			
Virginia—Continued.			
Rye Valley, South Fork of Holston River		20,000	
Sevenmile Ford, Holston River		10,000	
Sugar Grove, South Fork of Holston River			1,250
Waynesboro, spring		5,000	
Wytheville, Tates Run			2,250
West Virginia:			
Belva, Gauley River			2,000
Beverly, Beaver Creek			500
Files Creek			500
Brookside, Brookside Lake			800
Davis, Blackwater River			1,000
Little Blackwater River			940
Sand Run			310
Elkins, tributaries Tygarts Valley River			400
Howesville, Bires Creek Pond			200
Martinsburg, pond			300
Mill Creek Logging Camp, Mill Creek			800
Montrose, Barnett Pond			500
Roaring Creek Junction, Middle Fork Creek			1,000
Roaring Creek			1,800
Romney, Cedar Run			800
Ronceverte, Baileys Pond			1,000
Wisconsin:			
Glen Beulah, Otter Creek		4,000	
Argentina:			
Argentine Government Buenos Ayres	92,000		
Total[a]	286,000	442,160	345,204
Atlantic salmon.			
Maine:			
Brownville Pleasant River			190,717
Freeport, Casco Bay Fish Culture and Angling Association	3,000		
Grindstone, East Branch Penobscot River			45,220
Oakfield, East Branch Mattawamkeag River			53,165
Penobscot County, East Branch Penobscot River		727,462	
Missouri:			
St. Louis, Louisiana Purchase Exposition			86
Pennsylvania:			
Pleasant Mount, Pennsylvania Fish Commission	5,000		
Total	8,000	727,462	289,188
Landlocked salmon.			
Colorado:			
Leadville, Upper Evergreen Lake			50
Connecticut:			
Connecticut Fish Commission, Windsor Locks	10,000		
Maine:			
Bangor, Upper Brewer Pond			1,000
Bar Harbor, Great Pond		6,000	
Brooks, Colson Pond			1,000
Brake Pond			1,000
Hadley Pond			1,000
Passagassaewakeag Lake			2,000
Randall Lake			1,000
Camp Caribou, Parmachenee Club	20,000		
Canton, Lake Anasagunticook			1,000
Deadham, Branch Pond		17,000	
Phillips Lake			1,000
Ellsworth, Branch Pond			17,000
King Pond			1,000
Ellsworth Falls, Long Pond		6,000	1,000
Enfield, Cold Stream Lake			1,000
Eustis, Arnold Pond			1,000
Farmington, Clear Water Lake			1,000
Sweets Pond			1,000
Barnums Pond			2,000
Green Lake, Arnold Pond		7,011	
Holden, Fitz Pond		6,000	
Jackman, Spencer Pond			1,000
Maine Fish Commission, Greenville Junction	50,000		
Mattawamkeag, Molunkus Lake			1,000
North Anson, Emden Lake			1,000
Oldtown, Pushaw Lake			1,000

[a] There were lost in transit 6,310 fry and 3,870 fingerling rainbow trout.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Landlocked salmon—Continued.			
Maine—Continued.			
Otis, Green Lake		18,000	57,081
Perry, Lake Boyden		6,000	1,000
Phillips, Mount Blue Pond			1,000
Portage, Portage Lake			4,000
Presque Isle, Squawpan Lake			1,000
Princeton, Lake Sysladobsis			1,000
Searsmont, Quantabacook Pond			1,000
Searsport, Swan Lake			996
Sebago Lake, Sebago Lake			15,000
Sullivan, Tunk Pond		6,000	
Union, Crawfords Lake			1,000
Sennebec Pond			1,000
Warren, South Lake			1,000
Washington County, Grand Lake		150,000	
Wilton, Wilson Lake			1,000
Winn, Duck and Junior lakes		20,000	
Massachusetts:			
Grafton, Kitwell Pond			600
Massachusetts Fish Commission, Wilkinsonville	20,000		
Plymouth, Plymouth Rock Trout Co	5,000		
Pocasset, G. H. Richards	10,000		
Tehanto Club	5,000		
Michigan:			
Michigan Fish Commission, Sault Ste. Marie	10,000		
Missouri:			
Joplin, pond			20
St. Louis, Louisiana Purchase Exposition			80
New Hampshire:			
Bristol, Pasqueney Lake			600
Concord, Penacook Lake			500
Laconia, Lake Winnipesaukee			1,500
Lake Sunapee, Lake Sunapee			1,120
New Hampshire Fish Commission, Laconia	10,000		
Potter Place, Pond No. 1			400
Warner, Winnepecket			600
Wolfeboro, Lake Winnipesaukee			500
New York:			
New York, Battery Park Aquarium	2,000		
Caledonia, James Annin, jr	10,000		
Long Lake, South Pond		2,400	
Prospect, Big Rock Lake		2,400	
North Dakota:			
St. John, Gordon Lake		4,903	
Oregon:			
Portland, Lewis and Clark Exposition		3,000	
Vermont:			
Barton, Parkers Pond		3,000	
Barton Landing, Willoughby Lake		3,000	
Greensboro, Caspian Lake		6,290	430
Norton, Big Averill Lake		3,000	
Little Averill Lake		3,000	
West Burke, Newark Pond		2,000	
Argentina:			
Argentine Government, Buenos Ayres	30,000		
New Zealand:			
New Zealand Government, Wellington	10,000		
Total [a]	192,000	275,004	130,477
Blackspotted trout.			
Colorado:			
Antonito, Conejos River			50,000
Aspen, Castle Creek			30,000
Hunter Creek			30,000
Keno lakes			15,000
Maroon Creek			35,000
Berrys Ranch, Eagle River			140,000
Cebolla, Cebolla Creek			20,000
Gunnison River			20,000
Cimarron, Big Cimarron River			15,000
Silver Tip Lake			15,000
Colorado Fish Commission, Denver	75,000		
Colorado Springs, Prospect Lake			20,000
Creede, Rio Grande			90,000
Cripple and Spring creeks, between Colorado Springs and Cripple Creek			100,000

[a] There were lost in transit 15 yearling landlocked salmon.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Blackspotted trout—Continued.			
Colorado—Continued.			20,000
De Beque, pond			40,000
Mesa and Lily lakes			30,000
Del Norte, Pienas Creek			20,000
Delta, Gunnison River			150,000
Delta County, Alexander Lake			100,000
Barren Lake			10,000
Battlement Mesa Lake			25,000
Deep Slough			10,000
Dirty George lakes			100,000
Eggleston Lake			30,000
Forest Lake			20,000
Johnsons Reservoir			30,000
Kiser Creek			20,000
Lake Castle			25,000
Little Eggleston Lake			25,000
Mosquito Pond			20,000
Surface Lake			30,000
Twin Lakes			30,000
Ward Creek			100.000
Ward Lake			15,000
Dillon, Fry Lake			20,000
Snake Creek			20,000
Soda Creek			20,000
Ten Mile Creek			20,000
Willow Creek			75,000
Eagle County, Homestake and Eagle rivers			
Frying Pan River and tributaries, between Ivanhoe and			250,000
Thomasville			25,000
Georgetown, Green Lake			10,000
Glenwood, Cañon Creek			50,000
Glenwood Springs, Grizzly and No Name creeks			5,000
Grand County, Columbine Lake			50,000
Frazier River			180,000
Grand Lake			50,000
Grand River			50,000
Little Beaver Creek			25,000
North Fork Grand River			25,000
South Fork Grand Lake			10,000
South Fork Grand River			10,000
Stillwater Creek			5,000
Willow Creek			25,000
Grand Lake, East Inlet of Grand Lake			10,000
North Inlet of Grand Lake			15,000
North Shore of Grand Lake			100,000
Gunnison River, between Iola and Cimarron			20,000
Leadville, Arkansas River			20,000
Lake Creek			15,000
Lake Park Reservoir			30,000
Tennessee River			50
Upper Evergreen Lakes			40,000
Longmont, St. Vrain River			30,000
Loveland Big Thompson River			15,000
Lawn Lake			30,000
South Fork, Big Thompson River			250,000
Lyons, St. Vrain River			100,000
Mammoth, South Boulder Creek			15,000
Parachute, Battlement Creek			250,000
Platte River, between Grant and Pine Grove			20,000
Robinson, Placer Lake			35,000
Rio Grande County, South Fork, Rio Grande			25,000
Salida, Fairview Pond			55,000
Snowmass, Snowmass Creek			25,000
South Fork, South Fork, Rio Grande			80,000
Thomasville, Lake Alicia			15,000
West Cliff, Hermit Lake			
Idaho:			12,000
Council, Lick Creek			15,000
Kootenai County, Bonanza Pond			6,000
Oneida County, Samaria Creek			20,000
Rathdrum, Fish Lake			15,000
Shoshone, Snake River			
Missouri:			96
St. Louis, Louisiana Purchase Exposition	100,000		
Montana:			12,000
Anaconda, Warm Springs Creek			10,000
Belt, Belt Creek			90,000
Between Lombard and Harlow, Sixteen-Mile Creek			

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Blackspotted trout—Continued.			
Montana—Continued.			
Boulder, Muskrat Creek			12,000
North Fork of Little Boulder Creek			12,000
Bozeman, Bridger Creek			20,000
pond			10,000
Butte, Lake Palmer			10,000
Little Beauty Pond			5,000
Chester, Lairds Reservoir			10,000
Chinook, Clear Creek			10,000
Craig, North Fork Sun River			20,000
Dillon, Jake Canyon Creek			8,000
Price Creek			8,000
Spring Creek			6,000
Dorsey, Smith River			10,000
Drummond, pond			6,000
Emigrant, Emigrant Creek			8,000
Gallatin County, East Gallatin River			20,000
Lyman Creek			20,000
Great Falls, Sun River			13,000
Jefferson Island, Lost Cabin Lake and Creek			10,000
Kalispell, Patrick and Bowland creeks			46,000
Lennep, Allebaugh Creek			10,000
Comb Creek			8,000
Lewistown, Braids Pond			4,000
Little Casino Creek			6,000
Spring Creek			20,000
Tributary of Box Springs and Cottonwood creeks			10,000
Tributaries of Spring Creek			10,000
Livingston, Yellowstone River			15,000
Lothrop, Nine-Mile Creek			12,000
West Branch of Pattee Creek			12,000
Melrose, Canyon Creek			12,000
Missoula, Lo Lo Creek			15,000
Moore, Calbreth Coullee Creek			5,000
Neihart, Belt Creek			10,500
Middle Fork of Judith River			15,000
Pipestone, Big Whitetail Creek			12,000
Pipestone Creek			10,000
Pony, Cedar Lake			12,000
Salesville, trout pond			10,000
Sheridan, Branham Lake			12,000
Thompson, Graves Creek			10,000
Townsend, Deep Creek			15,000
Duck Creek			12,000
Twin Bridges, Lauterbach Pond			16,000
Whitehall, Prize Creek			3,000
Nebraska:			
Chadron, Beaver Creek			15,750
Big Bordeaux Creek			18,000
Chadron Creek			18,000
Little Bordeaux Creek			18,000
New Mexico:			
Chama, Chama River			50,000
Grants, San Luras Creek			20,000
Oregon:			
Portland, Lewis and Clark Exposition	100,000		
Rogue River Station, Elk Creek		26,205	
Trail, Rogue River			3,285
South Dakota.			
Artesian, O'Neal Lake			600
Black Hawk, Bogus Jim Creek			11,500
Box Elder Creek			11,500
Hot Mountain Gulch Pond			11,500
Buffalo Gap, Beaver Creek			50,000
Custer, French Creek			5,000
Sylvan Lake			40,000
Deadwood, Polo Creek			30,000
Elmore, Spearfish Creek			118,000
Upper Spearfish Creek			20,000
Englewood, South Fork of Spearfish Creek			25,000
Whitewood Creek			25,000
Galena, Bear Butte Creek			10,000
Hill City, Grizley Creek			15,000
Spring Creek			20,000
Sunday Creek			20,000
Hot Springs, Cascade Creek			25,000
Hat Creek			15,000
Piedmont, Spring Creek			18,000

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Blackspotted trout—Continued.			
South Dakota—Continued.			
Rapid City, Box Elder Creek			27,000
Cleghorn Pond			11,250
Lime Creek Pond			10,000
Pond and creek			16,000
Rochford, Castle Creek			15,000
Rapid Creek			90,000
North Fork			15,000
Roubaix, Elk Creek			65,000
St. Onge, McNeills Pond			10,000
Savoy, Little Spearfish Creek			51,000
Spearfish, Chicken Creek			15,000
Crow Creek			30,000
Mountain Lake			30,000
Spearfish Creek			447,000
Summers Creek			20,000
Sturgis, City Park Lake			15,000
Silver and Warren creeks			50,000
White Owl, Rock Creek			15,000
Utah:			
Indianola, Spencers Pond			20,000
Provo, Provo River			250,000
Salt Lake City, George Calder	30,000		
Washington:			
Colville, Little Pend O'Reille Lakes			15,000
Goldendale, Summit Creek		15,000	
Wyoming:			
Aladdin, Pine Creek			20,000
Beulah, Sand Creek			30,000
Cody, Wood River			25,000
Dale Creek, Dale Creek			150,000
Sheridan, Big Goose Creek			25,000
Jackson Creek			14,000
Lakes (5)			14,000
Prairie Dog Creek			14,000
Total [a]	205,000	41,205	6,288,031
Scotch sea trout.			
Maine:			
East Orland, Alamoosook Lake			3,479
Loch Leven trout.			
Iowa:			
Forestville, Spring Branch			200
Michigan:			
Detroit, City Aquarium			12
Missouri:			
St. Louis Louisiana Purchase Exposition			50
South Dakota:			
Rapid City, Rapid Creek			1,800
Savoy, Little Spearfish Creek		27,000	
Total		27,000	2,062
Lake trout.			
Colorado:			
Idaho Springs, Lake Ohman			1,200
Ivanhoe, Ivanhoe Lake			700
Connecticut:			
Connecticut Fish Commission, Windsor Locks	200,000		
Iowa:			
Clear Lake, Clear Lake			359
Storm Lake, Storm Lake			225
Maine:			
Farmington, Varnums Pond		20,000	
Fryeburg, Lake Kegar		20,000	
Michigan:			
Alpena, Hubbard Lake		125,000	
Lake Huron		1,450,000	
Ausable, Lake Huron		1,500,000	
Beulah, Crystal Lake		15,000	
Charlevoix, Lake Michigan		3,437,500	
Pine Lake		1,488,500	
Chippewa County, St. Marys River		500,000	
Detour, Lake Huron		2,000,000	
Fish Island, Lake Superior		320,000	

[a] There were lost in transit 5,000 fingerling blackspotted trout.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Lake trout—Continued.			
Michigan—Continued.			
Granite Point, Lake Superior		309,000	
Houghton, Lake Superior		310,000	
Irishmans Reef near Charlevoix, Lake Michigan		1,250,000	
Iroquois Point, Lake Superior		1,000,000	
Keystone, Lake Superior		360,000	
Isle d'Or Reef, St. Marys River		500,000	
Long Point, Lake Superior		360,000	
Mackinac Island, Straits of Mackinac		500,000	
Manistique, Lake Michigan		505,000	
Marquette, Lake Superior		670,000	
Michigan Fish Commission, Sault Ste. Marie	2,436,000		
Mosquito Bay, St. Marys River		500,000	
Naubinway, Lake Michigan		250,000	
North Point, Thunder Bay		1,680,000	
Oakland County, Union Lake			630
Ontonagon, Lake Superior		1,080,000	
Point Aux Pins, St. Marys River		394,000	
Presque Isle, Lake Huron		635,000	
Rock Harbor, Lake Superior		360,000	
Salt Point, Lake Superior		500,000	
Scarecrow Island, Lake Huron		1,615,000	
Sturgeon Point, Lake Huron		640,000	
Thunder Bay Island, Lake Huron		344,000	
Tobins Harbor, Lake Superior		320,000	
Todds Harbor, Lake Superior		320,000	
Topsail Island, St. Marys River		500,000	
Washington Harbor, Lake Superior		360,000	
Whitefish Point, Lake Superior		500,000	
Minnesota:			
Beaver Bay, Lake Superior		360,000	
Chicago Bay, Lake Superior		360,000	
Collegeville, St. Johns Lake		25,000	
Duluth, Lake Superior		75,000	
French River, Lake Superior		180,000	
Grand Marais, Lake Superior		360,000	
Grand Portage, Lake Superior		360,000	
Mouth of Poplar River, Lake Superior		360,000	
Ogilvie, Lewis Lake		25,000	
Two Harbors, Lake Superior		180,000	
Missouri:			
St. Louis, Louisiana Purchase Exposition	50,000		210
Montana:			
Bozeman, Sparrs Pond			2,000
Nebraska:			
Imperial, Bussell Lake			500
Champion Lake			500
Maranville Lake			400
New Hampshire:			
Ashland, Squam Lake		15,000	
Franklin, New Found Lake		15,000	
Freedom, Moon Lake		15,000	
Hancock, Long Pond		2,400	
New Hampshire Fish Commission, Colebrook	250,000		
Weirs, Lake Winnisquam		12,537	
West Ossipee, Lake Ossipee		15,000	
New York:			
Cape Vincent, Wilsons Bay		530,000	
Charity Shoals near Cape Vincent, Lake Ontario		300,000	
Cooperstown, Otsego Lake		25,000	
Dutch Point, Lake Ontario		750,000	
Fullers Bay, Lake Ontario		300,000	
Grenadier Island, Lake Ontario		2,203,000	
New York, Battery Park Aquarium	10,000		
New York Fish Commission, Caledonia	500,000		
Tibbets Point, Lake Ontario		768,000	
North Dakota:			
St. John, John Jay Lake		20,000	
Lake Gervais		15,000	
Ohio:			
Kelleys Island, Lake Erie		840,000	
Put-in Bay, Lake Erie		73,000	
Oregon:			
Oregon Fish Commission		8,000	
Portland, Lewis and Clark Exposition		4,500	
Pennsylvania:			
Pennsylvania Fish Commission, Corry	1,000,000		
Utah:			
Utah Fish Commission, Murray	100,000		

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Lake trout—Continued.			
Vermont:			
Barton Landing, Willoughby Lake		40,000	
Greensboro, Caspian Lake		58,829	4,745
Island Pond, Echo Lake		40,000	
Norton, Big Averill Lake		40,000	
Vermont Fish Commission, Roxbury	500,000		
Wisconsin:			
Bark Point, Lake Superior		320,000	
Between Port Wing and Sand Island, Lake Superior		360,000	
Wyoming:			
Wyoming Fish Commission, Sheridan	50,000		
Argentina:			
Argentine Government, Buenos Ayres	224,000		
Canada:			
Rossport, Lake Superior		300,000	
Total[a]	5,320,000	35,993,266	11,469
Brook trout.			
Colorado:			
Arrowhead, Baskers Creek		49,000	
Beaver Creek		24,500	
Frazier River		14,700	
pond on Frazier River		9,800	
Baileys, North Fork of South Platte River		50,000	
Between Shawnee and Baileys, Platte River			10,000
Between South Fork and Crede, Rio Grande River			15,000
Buena Vista, Hartenstein Lake		15,000	
trout pond			2,000
Buffalo, Cheesman Lake		50,000	
Wellington Lake		200,000	
Cimarron, Deep Lake		10,000	
Veo Creek		10,000	
Clyde, Middle Beaver Creek		25,000	
Colorado Springs, No Name Lake		10,000	
trout ponds (6)		15,000	
Crossons, North Fork of South Platte River		15,000	
Denver, G. H. Thompson	10,000		
Dillon, Boulder Creek		15,000	
Shade Creek		15,000	
Willow Creek		15,000	
Eldora, Lake Eldora		135,000	
Falcon, pond			5,000
Florence, Beaver Creek		25,000	
Georgetown, South Branch of South Clear Creek			2,000
Gillette, Upper Rhyolite Reservoir			5,000
Glenwood Springs, private pond			30
tributaries of Grand River		50,000	
White River			5,000
Grand Lake, Grand Lake		24,500	
Granite, pond		10,000	
trout pond			10,000
Grant, North Fork of South Platte River		20,000	
trout ponds		15,000	
Greenland, Lake William Dale			5,000
Idaho Springs, Hassell Lake			20,000
Lake Edith		100,000	4,000
St. Marys Lake			4,000
Ivanhoe, Frying Pan River and tributaries		50,000	
La Jara, trout pond		10,000	
Lake County, Derrys Ponds		7,500	
Crystal Lake		69,800	
Musgroves Lake		453,200	
Sugar Loaf Reservoir		50,000	
Leadville, Leadville High School			30
Lower Evergreen Lake			4,700
Middle Evergreen Lake		25,000	1,000
Smiths Pond		87,000	
trout ponds			75,000
waterworks reservoir			10
Loveland, Big Thompson River		50,000	
Hour Glass Lake			36,200
Lyons, St. Vrain River			8,000
Malta, Crystal Lake			9,000
Montrose, Haskill Lake		10,000	
Middle Spring Creek		10,000	
Morrison, Cony Lake		20,000	
Moraine Lake		20,000	
Witter Lake		20,000	

a There were lost in transit 75,000 fry and 26 fingerling lake trout.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
olorado—Continued.			
Morrie, Frying Pan River		50,000	10,000
Quinns, North Fork of Frying Pan River		25,000	
Rosemont, East Beaver Creek		10,000	
Salida, Fairview Fish Pond			5,000
Ridgway Pond		7,800	
Sellar, Frying Pan River and tributaries		25,000	
Shawnee, North Fork of South Platte River		50,000	
Telluride, Coal Creek		10,000	
Texas Creek, trout ponds			2,000
Thomasville, Frying Pan River		65,000	
Lake Alicia		190,000	
Ute Park, Chipita Lake		10,000	
Wellington Lake, Wellington Lake			275,000
Woodland Park, Beaver Creek		10,000	
Connecticut:			
Abington, Mashmoquet Creek			1,500
Avon, Knod Brook			1,000
Branford, Branford River			1,500
Brooksvale, Mill River			1,500
Madison, Neck River			1,000
New Haven, Foxon Lake			1,500
Norwalk, Barnum Brook		9,700	
Orange, Race Brook			1,500
Portland, Walnut Hill Creek		7,495	
Springdale, Spring Brook		8,000	
Stratford, pond			500
Wilton, Norwalk River		14,500	
Idaho:			
Bliss, Billingsley Creek			2,500
Riley Creek			1,500
Bonners Ferry, Sarvis Berry Lake			1,500
Hailey, Purdums Pond			2,500
Robinson Creek			2,500
Lewiston, pond			1,500
McCammon, Trout Lake			1,000
Market Lake, Spring Creek			1,500
Oneida County, Samaria Springs			1,500
Pocatello, Fall Creek			1,500
Soda Springs, Harris Pond			2,000
Spencer, Sheridan Lake			2,500
Thomas Turton	25,000		
Troy, Nelson Pond			1,000
Indiana:			
Crawfordsville, trout pond			1,000
South Bend, Spring Brook			2,500
Iowa:			
McGregor, Petersen Creek		5,000	
Manchester, Spring Branch			2,300
Waterville, Little Paint Creek		5,000	
Waukon, Bacons Branch		5,000	
Bear Creek		8,000	
Burr Oak Spring		5,000	
Clear Creek		5,000	
French Creek		8,000	
South Branch of Paint Creek		5,000	
Maine:			
Allens Mills, Bishop Brook and Clear Water Lake		127,500	
Belfast, St. Georges River		35,000	
Bethel, B Pond			1,500
Songo Lake		31,000	
Bingham, Rowe Pond		25,000	
Blue Hill, First, or Billings Pond		25,000	
Third, or Woods Pond		25,000	
Brooks, Great Farm Creek			1,600
Brownfield, Shepherd River			4,400
Bucksport, Williams Pond		18,685	
Burnham, Fletcher Brook		25,000	
Camden, Canaan Lake		30,000	1,500
Lake Alford		25,000	
Lake Maguntieook		25,000	
Camp Caribou, Parmachenee Club	50,000		
City Point, Oak Hill Lake			1,600
Coplin, Greens Pond			900
Cumberland Center, Red Rock Pond		20,000	
Rowes Pond			750
Dedham, Branch Pond		100,000	
Green Lake		104,000	
Morrison Ponds		25,000	
Phillips Lake		25,000	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Maine—Continued.			
East Orland, Craig Brook		4,501	
Craig Pond		30,656	
Heart Pond		22,000	
Toddy Pond		4,166	
Ellsworth, Pattens Pond		50,000	
Farmington, Little Jim Pond		31,000	
Great Brook, Green Lake		100,000	
Holden, Holbrooks Pond		25,000	
Kingfield, Tufts Pond		31,000	
Madison, Embden Lake			3,000
Morrill, Pasagasawakeag Creek			1,600
Newport, Pillsbury Pond		25,000	
Oquossoc, Mooselookmaguntic Lake			2,868
Orono, Chemo Pond		25,000	
Otis, Green Lake		60,000	2,053
Presque Isle, Squa Pan Lake		30,000	1,600
Rangeley, Gull Pond			1,800
Salmon Lake			3,300
Searsport, Swan Lake			3,200
Sebago Lake, Sebago Lake			4,400
Springvale, Lone Pond		32,000	
Surry, Toddy Pond		9,188	
Vienna, Flying Pond			1,500
Maryland:			
Alberton, Brices Run			155
Baltimore, Baltimore College	1,000		
Deer Park, North Glade Creek			2,000
Glencoe, Piney Run			500
Monkton, Elliotts Run			500
Oakland, Browning Dam			800
McLains Run			400
Perryville, dam on Mill Creek			1,000
Washington County, Nichols Branch			400
Massachusetts:			
Byfield, Jackman, Taylor, and Wheeler brooks		3,500	
Fall River, Shingle Island River			1,125
Hingham, Plymouth River		11,000	
Lawrence, Willow Pond		3,000	
Leominster, trout pond			375
Lowell, Spring Brook		6,000	
Massachusetts Fish Commission, Hadley	100,000		
Medfield, Spring Creek		5,000	
Northampton, Ahern Creek		6,000	
Roberts Meadow Brook			1,500
Saundersville, Champneys Brook		5,000	
Misco Brook		5,000	
Shelburne Falls, Clessons Lake			1,500
Deerfield River		15,000	2,000
Taunton, Cobbs Spring		5,000	
Worcester, William Lawrence	10,000		
Lake Quinsigamond			1,500
Agricultural Society Pond			30
Michigan:			
Addison, Posey Creek		10,000	
Alger, Bear Creek		15,000	
Alpena, Mitchell Creek		10,000	
Newton Creek		10,000	
Ausable, East Branch of Pine River		60,000	
Black River, Black River		35,000	
Corunna, Crooked Creek		5,000	
East Tawas, Silver and Gold creeks		60,000	
Emery Junction, Johnson Creek		30,000	
Smith Creek		100,000	
Fenton, Cranberry Creek		5,000	
Prestons Creek		5,000	
Grand Haven, Bass River			3,000
Greenbush, Cedar Creek		10,000	
Greenville, Stopes Creek		5,000	
Hillsdale, Happy Hollow Ponds		10,000	
Stocks Pond		5,000	
Holland, Half Way Creek			2,000
Holly, Buckhorn Creek		20,000	
Hudson, Fellows Creek			1,060
Iron River, Lake Fifteen			1,200
Kalamazoo, Campbell Creek		14,750	
Davis Creek		9,500	
Delnoes Creek		10,000	
Haden Creek		9,500	
Hall Spring Brook		9,500	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Michigan—Continued.			
Kalamazoo, Hampton and Portage lakes		14,250	
Mayville, Bear Creek		10,000	
Succor Creek		10,000	
Millington, Millington Creek		10,000	
New Buffalo, trout pond		15,000	
Northville, Spring Creek			5,000
Onaway, Owens Creek		5,000	
Rainy Creek		10,000	
Upper Black River		10,000	
Owosso, Willow Brook Pond		5,000	
Oxford, Benning Creek		10,000	
Kile Creek		10,000	
Kishpaugh Creek		10,000	
Meyers Creek		5,000	
Reeds Creek		5,000	
Stodard Creek		10,000	
Tanners Creek		5,000	
Pentwater, Cedar Creek		10,000	
Quinn Creek		10,000	
Plymouth, Orchard Hill Spring Brook		5,000	
Roscommon, Douglas Creek		25,000	
Thompson Creek		25,000	
Tawas City, Silver Creek		15,000	
Thompsonville, Betsey River		15,000	
Tobins Harbor, Tobins Harbor		5,000	
Union City, Pine Creek		9,500	
Washington Harbor, Grace Harbor Creek		5,000	
Washington Creek		5,000	
Minnesota:			
Caledonia, Crooked Creek			1,200
Carson, Rice River		6,000	
Rocky Run		5,000	
Detroit, Pelican River		5,000	
Duluth, pond		3,000	
Fishers Creek		5,000	
French River		6,000	
Lester River		6,000	
Little Colquit Creek		6,000	
Midway River		6,000	
Spring Brook		5,000	
Sucker River		6,000	
Talmadge River		5,000	
Little Falls, Clough Creek			1,000
Pentoga, Brule River		5,000	
Preston, South Branch of Root River			1,000
St. Charles, Trout Run			800
St Peter, Noonans Creek			1,000
Pauls Creek			1,000
Roberts Creek			1,000
Tower, Flint Creek		5,000	
Verndale, Wing River		6,000	
Missouri:			
Joplin, trout pond			20
Missouri Fish Commission, St. Joseph	100,000		
St. James, Merrimack Springs			1,100
St. Louis, Louisiana Purchase Exposition			42
Montana:			
Alder, Spring Brook			500
Belt, Belt Creek			1,000
Big Bend, Trout Run			1,500
Boulder, Buffalo Creek			4,900
Bozeman, Hell Roaring Creek			5,000
Meadow Brook			2,500
Butte, Fish Creek			4,000
Chester, Bear Gulch Lake			1,000
Half Breed Brook			1,250
Wearley Lake			1,000
Dillon, Cat Creek			1,500
Cottonwood Creek			2,500
Rattlesnake Creek			3,500
Fork of Black Tail Deer Creek			3,000
Emigrant, Fridley Creek			1,500
Gallatin County, Bridger Creek			20,000
Glen, Willow Creek			3,000
Kalispell, Cusick Creek			1,000
Hamans Creek			1,000
Millers Creek			1,000
Upper Lost Creek			2,000
Lewistown, Fergus Pond			500

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Montana—Continued.			
Lewistown, Spring Creek			3,500
Stroufs Pond			1,500
Tyler Creek			3,000
Lima, Warm Spring Creek Pond			1,500
Lombard, Sixteen-Mile Creek			4,500
Lothrop, Butler Creek			2,500
Missoula, Grant Creek			3,500
Lo Lo Creek			500
Rattlesnake Creek			3,500
Neihart, O'Brien Creek			1,250
Red Rock, Wild Rose Lake			2,000
Sappington, pond			1,500
Sheridan, Crystal Lake			1,500
Silver, Little Prickly Pear Creek			2,000
Stevensville, Spring Creek			1,500
Nebraska:			
Imperial, pond			800
Lake Kunkel			800
Nebraska Fish Commission, South Bend, Verdigris Creek			4,000
Nevada:			
Battle Mountain, Pine Creek			2,000
New Hampshire:			
Ashland, Brown Brook			1,500
Bradford, Mountain Brook			2,000
Bristol, Danforth Creek			1,000
Canaan, Indian River			2,000
Cavender, Peterboro Brook			2,000
Charlestown, Big Brook			1,800
Chamberlain Brook			1,500
Hackett Brook		6,000	
Claremont, Little Sugar River			1,500
Red Water Brook			1,500
Colebrook, Big Diamond Pond			1,500
Greenough Pond			1,500
Concord, Dallapp Brook			1,500
Quarry Pond		3,000	
Thayers Pond		4,000	
Dover, Isinglass River		20,000	
Mill Brook		6,000	
Exeter, Dudley Brook			1,500
Fabyans, Ammonusuc River			4,700
Saco Lake			1,000
Grafton, Spring Creek			2,000
Greenville, Cold Spring Brook			2,000
Furnace Brook			2,000
Miller Brook		8,000	
Groveton, Nash Creek Pond			1,125
Hilisboro Shed River Brook			1,800
Hinsdale, Liscom Creek		5,000	
Hookset, Bear Hill Pond		5,000	
Lake Sunapee, Lake Sunapee			2,000
Littleton, Profile Lake and tributaries			2,500
Manchester, Bakersville Brook		6,000	1,500
Bowman Brook		10,000	
Damon Brook		8,000	2,000
Damon mill pond			1,500
Dearborn Creek		7,000	
Dr. Little Brook		8,000	1,000
Dumpling Brook		5,000	1,500
Farm Brook		6,000	1,000
Golf Club Creek			1,500
Harris Brook		5,000	
Harry Brook		5,000	
James Brook		7,000	
Mantor Brook		4,000	1,500
Mead Brook			1,500
Millstone Brook		6,000	
Nigger Brook		6,000	2,000
Patten Brook			2,000
Peters Brook			1,500
Pierce Brook		5,000	
Pulpit Creek		10,000	
Ray Brook		7,000	
Spring Creek			1,500
Spring Pond			200
Stump Meadow Brook			1,000
Sudden Pitch Creek		5,000	
Tannery Brook		6,000	1,000

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
New Hampshire—Continued.			
Milford, Nanagnog Creek		6,000	
Nashua, Brickyard Brook		6,000	
Chase Brook		5,000	
Chase and Brickyard brooks			1,600
Collins Brook			1,500
Wentworth Pond			1,200
New London, Lake Sunapee			15
Peterboro, Town Line Brook		6,000	
Plymouth, Clay Brook			1,500
Halls Ponds		5,000	
Potter Place, Cole Pond		6,000	
Ragged Mountain Pond			1,600
Raymond, Branch River		5,000	
Dudley Brook		5,000	
Forbray Brook		5,000	
Lanes Brook		6,000	
Pine Hill Brook		5,000	
Scribners Brook		5,000	
Robys, Slaughter Brook		6,000	
Sanbornville, Mountain Lake			1,500
Suncook, Boat Meadows Creek		5,000	
Troy, Sand Brook		6,000	
Warner, Osgood Brook		6,000	
Silver Brook		6,000	
Stevens and French brooks		6,000	
West Alton, Emmerson brook		7,000	
West Springfield, Kolelemook Pond			24
West Swanzey, Spring Brook		5,000	
Wilton, Blood Brook			1,500
Spring Pond			1,125
Winchester, Roaring Brook			1,500
Wolfboro, Hayth Brook		10,000	
New Jersey:			
Blairstown, Wildricks Brook			200
New Mexico:			
Between Osiers and Chama, Los Pinos and Chama rivers		50,000	
New York:			
Apulia, Butternut Creek		30,000	
Beaver River, Twichel Creek		25,000	800
Bliss, Wiscoy Creek		20,000	
Boonville, Spring Brook		15,000	
Catskill, Kiskatom Creek			600
Cattaraugus, Branch Cattaraugus Creek			500
Chenango Forks, Castle Creek		15,000	
Page Brook			400
Thomas Brook		15,000	
Coopers Plains, Dry Run		20,000	
East Branch, Twaddell Brook		15,000	
Ellenville, Sanburg Creek		20,000	
Fleischmans, trout pond			200
Freeville, Fall Creek		15,000	
Halfway, Carpenters Brook		15,000	
Horseheads, Catherine Brook		25,000	
Ithaca, trout pond		15,000	
Liberty, Middle Mongaup Creek		30,000	
New York, Battery Park Aquarium	10,000		
New York Fish Commission, Cape Vincent Station		260,540	
Northville, Stony Creek		30,000	
Oneonta, Otsego Creek		30,000	
Otego, Otsdawa Creek		20,000	
Owego, West Creek		30,000	
Richfield, Otsego Lake		15,000	
Richland, Pekin Brook		25,000	
Potter Brook		25,000	
Stittville, Spring Brooks		10,000	
Syracuse, Gedder Brook			400
Montfredy Brook		15,000	
Waterville, East Canada Creek			800
Oriskney Creek		30,000	
North Carolina:			
Boonford, Big Rush Creek		13,500	
Big Crabtree Creek			1,000
White Oak Creek			1,000
Brevard, Bushy Creek			800
Cagle Creek			800
Kings Creek			500
Kuykendall Creek			800
Nigger Fork Creek			2,000

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
North Carolina—Continued.			
Hendersonville, Finlays Creek		1,000	
Penland, Bailey Creek		3,750	
North Dakota:			
Oakes, Denning Lake			1,000
St. John, mill lake		5,000	
Oak Lake		5,000	
Ohio:			
Bellefontaine, Buckinghalas Creek		10,000	
Mad River		10,000	
Stony Creek		10,000	
Chillicothe, Spring Lake			600
Cleveland, Chagrin Valley Creek		25,000	
Lucas, Crystal Lake		5,000	
Ravenna, Cuyahoga River tributaries		15,000	
Unionville, Cunningham Lake		10,000	
Oregon:			
Cottage Grove, Champion Creek		100	
Portland, Lewis and Clark Exposition		10,000	250
Roseburg, Deer Creek		100	
Pennsylvania:			
Altoona, Blair Run			500
Canoe Creek			600
Clover Creek			500
McAllisters Pond			400
Mill Run			500
Piney Creek			500
Spring Run			500
Ashland, Broad Mountain Run			400
Old Buck Mountain Pond			200
Auburn, Stony Creek			400
Bear Run, Bear Run			1,000
Sir Johns Run			300
Bellefonte, Bald Eagle Creek			700
Buffalo Run			600
Greens Valley Creek			600
Little Fishing Creek			600
Logans Branch			500
McBrides Gap Creek			400
Pleasant Gap Run			400
Spring Creek			1,000
Berlin, Laurel Run			400
Brandonville, Deebels Run			400
Messa Run			400
Ulshafer Creek			400
Wolfs Creek			400
Bushkill, Big Bushkill Creek			600
Little Bushkill Creek			600
Canadensis, Broadhead Creek			600
Goose Pond Run			600
Mill Creek			500
Rattlesnake Creek			400
Carlisle, Letort Creek			600
Center Hall, Laurel Run			500
Confluence, Draketown Run			300
Youghiogheny River			1,300
Cresco, Broadhead Creek			1,200
Buck Hill Creek			400
Bushkill Creek			600
Crooked Hollow Run			500
Currys Station, Cotter Creek			500
Hoffmans Creek			600
Middle Branch			1,200
Mountain Creek			600
Woodbury Dam			300
Delaware Water Gap, Caldeno Creek			400
Cherry Creek			300
Depews Run			300
Felkers Run			400
Lamberts Run			300
Mountain Run			400
Stiles Run			300
Wild Cat Creek			400
Du Bois, Anderson Creek			450
Ebensburg, Blacklick Creek			600
Noels Run			300
Falls Creek, Wolf Run			400
Frackville, Blackberry Run			300
Little Mahanoy Creek			600
Tower Run			400

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Pennsylvania—Continued.			
Frazer, Valley View farm pond			100
Gaines Junction, Pine Creek			650
Gans, Crystal Pond			150
Good Spring, Good Spring Pond			150
Gordon, Rattling Run			400
Ravine Creek			400
Spring Creek			400
Tar Run			300
Teipolts Run			400
Hopewell, Maple Run			500
Otts Run			400
Yellow Creek			600
Hughesville, Spring Brook			200
Hyndman, Wills Creek			500
Keating Summit, Portage Creek			600
Kennet Square, Pocopson Creek			500
Lehighton, Branch of Mahoning Creek			400
Lewisburg, Cherry Run			600
Rapid Run			650
Lorane, Antietam Creek Pond			300
McCalls Ferry, Kellys Run			500
Mahanoy City, Deep Creek			600
Locust Creek			1,400
Stony Creek			500
Marietta, Gladfelter Creek			900
Markleton, Markleton Creek			400
Meadville, Spring Branch			300
Mifflin, Big Run			600
Macedona Run			400
Mount Pocono, Devils Hole Creek			500
Wilsons Spring Run			300
Mountain Home, Levis Branch			600
New Bethlehem, Sloans Run			300
Nordmont, Cherry Run			400
Hunters Run			400
Long Brook			400
Muncy Creek			300
South Branch Falls Run			400
Spring Run			400
Parsons, Deep Hollow Creek			1,000
Gardner Creek			500
George Run			400
Kelly Pond			650
Laurel Run			600
Sandy Run			600
Tenmile Creek			500
Warden Creek			600
Warden Town Creek			650
Pennsylvania Fish Commission, Herrick Center			4,000
Port Allegheny, E. R. Helmer	25,000		
Skinner Creek			500
Pottsville, Cold Run			500
East Branch of Cold Run			400
Francis Creek			300
Millers Creek			400
Schwartz Creek			300
Silver Creek			400
Tar Run			500
Wolf Creek			200
Ralston, Pleasant Brook			650
Rattling Run, Rattling Run			600
Reading, Browns Brook			400
Rising Springs, Penns Creek			800
Rosemont, trout pond			100
Salix, Big Paint Creek			400
Saylorsburg, Gowers Run			200
Princess Run			400
Shenandoah, Davis Creek			1,000
Stony Creek			1,000
Snow Shoe, South Fork of Beech Creek			700
Starrucca, McKane Creek			400
Merrigan Creek			400
Shadagee Creek			600
Thompson Creek			500
Stewartstown, Anderson Branch			350
Stroudsburg, Broadhead Creek			1,200
Daniels Run			300
Marshalls Creek			600

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Pennsylvania—Continued.			
Stroudsburg, Pocono Creek			600
Rock Springs Brook			300
Susquehanna, Brushville Creek			400
Canawacta Creek			500
Cold Spring Brook			400
Drinken Creek			400
Egypt Creek			500
Little Hemlock Creek			400
Shattague Creek			500
Starrucca Creek			650
Tamaqua, Bushy Run			400
Tomhicken, Sugar Loaf Creek			500
Tower City, Rattling Creek			500
Tremont, Black Creek			500
Crane Creek			400
Gold Mine Creek			600
Jeffs Creek			500
Middle Creek			400
Poplar Run			300
Troy, Bullard Creek			500
Coreob Creek			600
Fellms Creek			400
Kiff Run			400
Morgan Creek			400
Porter Creek			600
Rathbone Creek			600
Sam Millers Run			400
Webber Creek			560
Wampum, trout brook			900
Westover, Rogue Harbor Creek			400
Wetham, Rattlesnake Run			1,200
Williamsport, Wolfe Creek			400
South Dakota:			
Belle Fourche, Hay Creek		15,000	
Buffalo Gap, Beaver Creek mill pond			3,500
Custer, Sylvan Lake		25,000	15,000
Elmore, East Branch Little Spearfish Creek		25,000	
South Branch Little Spearfish Creek		30,000	
Spearfish Creek		25,000	3,000
Englewood, Bear, Butte, and Big Elk creeks		30,000	
Pond		5,000	
Spring Pond		5,000	
Whitewood Creek		15,000	
Hill City, Spring Creek		25,000	
Hot Springs, Cascade Creek		15,000	
Kyle, American Horse Creek		7,500	
Hermans Pond		5,000	
Kocers Pond		4,000	
Medicine Root Creek		7,500	
Pierre, Medicine Creek Pond			1,000
Rapid City, Rapid Creek		25,000	
Rochford, Castle Creek		25,000	
Little Rapid Creek		25,000	
Rosebud, Cedar Creek		7,500	
Lone Creek		10,000	
Rosebud Creek		7,500	
Soldier Creek		7,500	
Willow Creek		10,000	
Savoy, Little Spearfish Creek			3,000
Spearfish, Coxes Lake		10,000	
Crow Creek		25,000	
Driskill Pond			3,000
Montana Lake		15,000	
Schmidt Pond		10,000	
Spearfish Creek		128,500	
Spring Pond		5,000	
Summers Pond			2,000
trout pond			3,500
Watercress Creek		20,000	
Tennessee:			
Fishery, Spring Branch			1,947
Greenville, Davis Creek		2,000	
Harriman, Emory River			1,200
White Pine, French Broad River			1,200
Utah:			
Gunnison, Twelvemile Creek		10,000	
Manti, Manti Creek		15,000	
Sixmile Creek		10,000	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Utah—Continued.			
Mount Pleasant, Mount Pleasant Creek		15,000	
Provo, Fish and Thistle creeks and White River		55,000	
Provo River			4,775
Salt Lake City, Bungalow fish ponds		10,000	
Thistle Junction, Log Cabin Spring			2,000
Tributaries of Provo River, between Provo and Heber		135,000	
Tucker, Tucker Creek		10,000	
Utah Fish Commission, Murray	100,000		
Vermont:			
Braintree, Brackett Brook		15,000	
Brattleboro, Cane Brook		6,000	
Murder Hollow Brook		6,000	
Salmon Brook			1,500
Slate Rock Creek		10,000	
Spring Creek		10,000	
Waites Creek		10,000	
Whetstone Brook		10,000	1,000
Chester, Love Lane Brook		6,000	
South Branch		8,000	
Groton, Darling Pond		125,000	
Jamaica, Kidder Brook		5,000	
Pikes Falls Brook		6,000	
Lyndonville, Spring Brooks		25,000	
Manchester, Spring Brook			1,960
Middlebury, Ridley and Hewitt brooks		30,000	
Montpelier, Bennett Brook		25,000	
Herrick Brook		25,000	
Langdon Pond		25,000	
Nicholas Pond			500
Wordners Pond		20,000	
Yatter Pond		20,000	
North Troy, Hunts Pond		10,000	
Poultney, Poultney River			1,000
Proctor, Pico Pond			2,000
Putney, Houghtons Pond		5,000	
Westminster Brook		10,000	
Randolph, Ayres Brook		25,000	
Chandler Brook		25,000	
Hatch Pond and Brook		20,000	
Mafeba Lake		20,000	
Mud Pond		20,000	
Peth Brook		25,000	
ponds (2)		20,000	
Roxbury Creek		20,000	
Wellington Brook		25,000	
White River		15,000	
Richford, Harwood Pond		25,000	
Rutland, Lendon Branch			1,000
St. Johnsbury, frog pond		25,000	1 125
Hoveys Pond		20,000	
South Ryegate, Dawes Pond		30,000	
Scott Brook		25,000	
Webster Brook		30,000	
Springfield, Whitmores Brook			600
Swanton, Diana Brook		25,000	
Townshend, Joy Brook			500
West Dummerston Brook			500
Waterbury, Lake Mansfield		100,000	500
Wells River, Peach Brook		35,000	
Wells River Fish and Game Club Pond			750
West Hartford, pond and stream			1,000
West Norwich, Lake Mitchell		125,000	
Williamstown, branch of White River		31,200	
Woodstock, Black Pond		25,000	
Dean Brook		20,000	1,000
Lakota Lake		25,000	
Meccawe Lake		20,000	
North Pomfret Brook		25,000	
Winslow Brook		25,000	
Virginia:			
Alleghany County, Jerrys Run		30,000	
Amherst, Big Piney River			800
Bedford City, Gunstock Creek			800
Hunting Creek			800
Blue Ridge, Ricley Mill Pond		5,000	
Clifton Forge, Smith Creek		50,000	
Wilsons Creek		49,500	
Covington, Castle Run		20,000	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Virginia—Continued.			
Covington, Falling Spring Branch		20,000	
Laurel Run		40,000	
Pounding Mill Pond		20,000	600
Fairwood, Fox Creek			1,000
Front Royal, Indian Creek		40,000	
Gala, Mill Creek		50,000	
Harrisonburg, Dry River		50,000	
Hot Springs, Kelly and Spring runs			1,000
Hunters, Snake Den Creek		29,500	11,760
Millboro, Mill Creek			1,000
Potters Branch			1,000
Newcastle, Barbers Creek		50,000	
Spencer, North Mayo River			800
Winchester, Darbs Creek			1,100
West Virginia:			
Bartow, East Branch Greenbrier River		49,600	
Beverly, Beaver Creek			500
Files Creek			500
Camden on Gauley, Gauley River			1,500
Capon Springs, branch of Capon River			500
Cheat Bridge, F. A. Degler	25,000		
Cranberry, Cranberry Creek			500
Davis, Beaver Creek			625
Blackwater River		49,000	1,625
Durbin, New Meadow Pond		50,000	
Eglon, Horseshoe Pond			200
Elkins, tributary of Tygarts Valley River			400
Hackers Junction, Tygarts Valley River			1,000
Harman, Spruce Run		25,000	
Holly Junction, Elk River			1,000
Jobs Knob, Big Clear Creek		19,900	
Limerick Junction, Buckhannon River			1,000
Mill Creek logging camp, Mill Creek			800
Richwood, Cherry Creek			1,300
Roaring Creek Junction, Middle Fork River			1,000
Roaring Creek			1,800
Shryock, Meadow Creek		30,000	
North Fork of Anthonys Creek		30,000	1,000
Sutton, Elk River			1,000
Terra Alta, pond			300
Wildell, West Fork Greenbrier River		50,000	
Wisconsin.			
Alma, Hitts Creek			1,000
Knabe Creek			1,000
Little Waumanbee Creek			1,000
Mill Creek			1,000
Silver Creek			1,000
Trout Creek			1,000
Wingers Creek			1,000
Alma Center, Alma Creek			1,000
Boree Creek		4,000	
Amherst, Peterson Creek		4,000	
Tomarron River		4,000	
Waupaca River		3,500	
Arcadia, American Valley Creek			1,200
Augusta, Beef River			1,000
Travis River			1,500
Birnamwood, Plover River		3,500	
Blair, Trunks Creek		3,500	
Vosse Cooley Creek		3,500	
Chippewa Falls, West Fork of O'Neills Creek		3,500	
Eleva, Trout Creek			1,200
Elkhard Lake, branch of Mullet River			1,200
Fairchild, Scott Creek			1,000
Spring Creek			800
Fountain City, Bohris Valley Creek			800
Kochenderfer Valley Creek			800
Branch Eagle Valley Creek			800
Oak Valley Creek			800
Right branch of Eagle Valley Creek			800
Schoepps Valley Creek			1,200
Galesville, Beaver Creek			1,200
French Creek			1,200
Greenwood Black Creek			1,200
Cawley Creek			1,200
Gile Creek			1,200
North Fork Rock Creek			1,200
Norwegian Creek			1,200
Rocky Run			

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Wisconsin—Continued.			
Hazelhurst, Rocky Run			1,000
Hixton, Tank Creek		3,500	
Independence, Chimney Rock Creek		3,500	
Travers Valley Creek		3,500	
La Crosse, Adams Valley Creek		7,000	
Irish Coolie Creek		3,500	
Krauts Creek			1,000
Morman Coolie Creek		3,500	
North Branch of Chipmonk Coolie Creek		3,500	
North Branch of Coon Creek			1,200
Rose Creek		3,500	
South Branch of Half Way Creek		3,500	
State Road Coolie Creek		3,500	
Lake Nebagamon, Hansons Creek		6,000	
Wilson Creek		6,000	
Menominee, Annis Creek		3,500	
Clacks Creek		3,500	
Gilbert Creek		3,500	
Hay Creek		3,500	
Irving Creek		3,500	
Knights Creek		3,500	
Lambs Creek		3,500	
Little Elk Creek		3,500	
Varney Creek		3,500	
Merrill, Prairie River		8,000	
Mondovi, Ford Creek			1,000
Harvey Creek			1,000
Rock Creek			1,000
Rossman Creek			1,000
New Auburn, Duncan Creek		3,500	
Sand Creek		3,500	
New Lisbon, Jackson Creek			1,200
Norwalk, branch of Morse Creek		4,000	
Morse Creek		3,500	
Plymouth, Mullet River			1,500
Rhinelander, Indian Creek		4,000	
Richland Center, Ash Creek			1,000
Rockland, Big Creek			1,000
Fish Creek			1,000
Sparta, Tar Creek		6,500	
Taylor, Pine Creek		3,500	
Viroqua, Bishop Branch		3,500	
Cheatem Branch		3,000	
Cook Branch		3,000	
Duck Egg Creek		3,000	
Esofa Creek		3,000	
Getter Creek			1,000
Harrison Creek		3,000	1,000
Lees Branch		3,000	
Middle Bad Axe Creek		3,500	
South Bad Axe Creek		3,500	
Tainter Branch		3,500	
Waupaca, Dayton Creek		4,000	
Wausau, Black Creek		4,000	
Gimmore Creek			1,200
Kennedy Creek		4,000	
Little Rib River		4,000	
Little Trappe Creek		4,000	
Moe Creek		4,000	
Sand Creek		4,000	
Wautoma, White River		4,000	
West Salem, Spring Creek		3,500	
Whitefish Bay, Lake Minnehaha		4,000	
Whitehall, Elk Creek		3,500	
Fly Creek		3,500	
Pigeon Creek		3,500	
Whittlesey, Fish Lake			1,000
Wild Rose, Pine River		4,000	
Wilton, Sink Creek		3,500	
Woodman, Big Green River		3,500	
Wyoming:			
Between Cheyenne and Laramie, Dale Creek and Reservoir		50,000	
Beulah, Sand Creek		15,000	
Cheyenne, Granite Springs			2,000
Cokeville, Smiths Fork River			2,000
Granite Canyon, Crow Creek and Reservoir		40,000	
Kemmerer, Hams Fork of Green River		20,000	1,000
Mammoth Hot Springs, ice pond		11,000	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Brook trout—Continued.			
Wyoming—Continued.			
Mammoth Hot Springs, Indian Creek and Gardiner River		25,000	
Swan Lake		10,000	
Willow Creek		37,000	
Newcastle, Oil Creek		4,750	
Stockade Beaver Creek		9,500	
Sheridan, Alger Pond		4,750	
Lost Gulch Creek		4,750	
Piney Pond		4,750	
Piney Creek		12,000	
Yellowstone National Park, Gibbons River above Virginia Cascades		17,000	
Willow Creek			27,000
Total [a]	456,000	8,933,881	1,083,454
Golden trout.			
New Hampshire:			
Lake Sunapee		157,490	
Oregon:			
Portland, Lewis and Clark Exposition			269
Grayling.			
California:			
California fish commission, Sisson	150,000		
Michigan:			
Michigan fish commission, Detroit	100,000		
Missouri:			
Joplin, pond			20
Montana:			
Gallatin County, Bozeman Creek		100,000	
Bridger Creek		150,000	
East Gallatin River		100,000	
Lyman Creek		100,000	
Oregon:			
Portland, Lewis and Clark Exposition	50,000		
Utah:			
Utah fish commission, Murray	50,000		
Wyoming:			
Wyoming fish commission, Sheridan	50,000		
Total	400,000	450,000	20

Species and disposition.	Fingerlings, yearlings, and adults.
Pike.	
Illinois:	
Blanding, Mississippi River	8,000
East Dubuque, Mississippi River	5,000
Galena, Mississippi River	9,000
Savanna, Mississippi River	5,500
Iowa:	
Bellevue, Mississippi River	13,300
Clayton, Mississippi River	1,500
Dubuque, Mississippi River	1,200
Gordons Ferry, Mississippi River	7,200
Green Island, Mississippi River	2,000
North McGregor, Mississippi River	1,000
Wisconsin:	
Cassville, Mississippi River	1,500
Glenhaven, Mississippi River	2,000
Lynxville, Mississippi River	5,000
Total	62,200
Crappie.	
Idaho:	
Troy, pond	200
Illinois:	
Blanding, Mississippi River	50,000
Collinsville, brickyard pond	150

Species and disposition.	Fingerlings, yearlings, and adults.
Crappie—Continued.	
Illinois—Continued.	
Columbia, Aherns Lake	200
East Dubuque, Mississippi River	40,000
Galena, Mississippi River	85,000
Hillsboro, Bogues Lake	150
Glens Stretch Creek	200
Hillsboro Lake	200
pond	100
Lone Tree, Lone Tree Lake	200
Millstadt, Pistors Pond	100
pond	150
Richland Pond	100
Monmouth, Cloverdale Pond	100
Paris, Fish Club Lake	200
Savanna, Mississippi River	66,000
Indiana:	
Bloomington, Quarry Pond	50
Boonville, pond	100
Culver, Lake Maxinkuckee	750
Dana, pond	75
Evansville, Country Clubs Lake	500
Georgia, Birdfield Pond	150
Indianapolis, West Fork of White River	1,000
Lake Cicott, Lake Cicott	55
Lapel, Stony Creek Pond	109

[a] There were lost in transit 94,250 fry and 6,310 yearling brook trout.

Details of Distribution—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Crappie—Continued.	
Indiana—Continued.	
Lebanon, Higgins Gravel Creek	65
Logansport, Eel River	100
Madison, Smiths Pond	150
Milton, Greens Fork Creek	300
Martindale Creek	300
Nolands Fork Creek	300
Symons Creek	300
West Fork of White River	300
Monticello, Tippecanoe River	95
Muncie, pond	125
Perth, gravel pit	60
Plymouth, Pretty Lake	200
Rushville, Big Flat Rock River	400
Somerville, Martins Lake	50
Tipton, Plum Grove Pond	45
Indian Territory:	
Ardmore, Railroad Lake	200
Swan Lake	200
South McAlester, waterworks pond	150
Iowa:	
Bellevue, Mississippi River	76,000
Charles City, Cedar River	4,850
Chester, upper Iowa River	600
Clayton, Mississippi River	30,000
Clear Lake, Clear Lake	250
Dubuque, Mississippi River	30,000
Fairfield, city waterworks reservoir	5,500
Gordons Ferry, Mississippi River	115,000
Green Island, Mississippi River	40,000
Hawkeye, Alpha Mill Pond	170
Iowa Falls, Iowa River	5,000
Lainsville, Mississippi River	40,000
Lime Springs, upper Iowa River	300
Manchester, Maquoketa River	3,000
North McGregor, Mississippi River	25,000
St. Ansgar, Red Cedar River	200
Smiths Ferry, Mississippi River	70,000
Wadena, Volga River	5,000
Waterloo, Cedar River	3,000
Winthrop, Wapsipinicon River	2,500
Kansas:	
Abilene, Bass Lake	75
Blue Rapids, Big Blue River	100
Brownell, pond	100
Burdett, Pawnee River	200
Burlingame, Guiles Pond	100
Burton, pond	75
Cairo, Cairo Lake	100
Cambridge, Grouse Creek	200
Emporia, Cottonwood Creek	150
Great Bend, Evergreen Lake	75
Luse Pond	75
Heizer, pond	100
Hoisington, pond	75
Hutchinson, Red Rock Pond	100
ponds (2)	250
Kansas City, Whites Pond	80
Kansas Fish Commission, Pratt	75
Kingman, lake	75
Weinschenks Lake	75
Lang, pond	75
Lenexa, Allens Pond	75
Leoti, ponds (2)	200
Logan, pond	50
Luray, Langleys Pond	115
McCracken, pond	100
Mankato, Rock Island ponds	50
Marion, ponds	75
Mulberry, ponds (3)	200
Ness City, pond	100
McBrides Pond	100
South Fork of Walnut Creek	200
Crappie—Continued.	
Kansas—Continued.	
Oakley, pond	75
Otis, Gisick Pond	75
Pittsburg, Hogans Pond	75
Sawyer, pond	75
Scott, pond	100
Summerfield, Elisa Lake	150
Wellington, Slate Creek	200
Zenda, Willowdale Lake	150
Kentucky:	
Covington, lake	200
pond	200
Erlanger, Blick Place Pond	100
Frankfort, Maple Pond	75
Trimbles Pond	400
Hodgensville, Slaughter Pond	500
Hopkinsville, Little River	200
Jetts, pond	150
Lebanon, pond	100
Roaring Fork River	525
Louisville, pond	150
Marion, Grays Pond	75
Greens Pond	75
James Pond	150
Summers Pond	75
Willow Pond	150
Morganfield, Houston Pond	100
Mount Sterling, pond	75
Salvisa, Royalty Pond	150
Stanford, water company's reservoir	150
Versailles, Hampton Pond	75
Oakview Pond	75
Williamstown, Lagoon Springs	100
Winchester, Bush Pond	125
Ecton Pond	100
pond	100
Redmon Pond	100
Spahr Pond	100
Wheeler Lake	150
Waterworks Lake	200
Louisiana:	
Calhoun, pond	150
Mansfield, Hewitts Pond	150
Parsons Pond	100
New Orleans, Davis Pond	100
Shreveport, Bungalow Pond	100
Trenton, pond	75
Maryland:	
Riverdale, Eastern Branch Potomac River	300
Michigan:	
Clare, Tobacco Creek	175
Minnesota:	
Fergus Falls, Lost Lake	200
Mississippi:	
Boonville, Boonville Lake	637
Columbus, gravel pit	75
Corinth, Adams Lake	300
Coon Creek Pond	300
Long Pond	200
Santa Fe Lake	200
Durant, railroad pond	50
Fayette, McGintys Pond	75
Hazelhurst, Bass Pond	125
Purnell, Quiver Creek	400
Scooba, ponds (5)	450
Shuqualak, Combs Pond	75
West Point, pond	100
Missouri:	
Greenwood, Hillcrest Lake	100
Independence, ponds (3)	75
St. Louis, Louisiana Purchase Exposition	26
Montana:	
Great Falls, pond	100
Nebraska:	
Lodgepole, Oberfelder Lake No. 4	350
Seymour, Lake Seymour	400
Verdon, Hardens Lake	100

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Crappie—Continued.	
New York:	
Utica, water company's reservoir	150
North Carolina:	
Littleton, Johnstons Pond	130
Ohio:	
Chillicothe, Elensmere Lake	400
Dayton, Soldiers' Home Lake	200
Geauga Lake, Geauga Lake	150
Oak Hill, pond	100
Oklahoma:	
Aline, pond	75
Aurora, pond	75
Comanche County, Walnut Creek	75
Dover, pond	30
Edmond, Edmond Lake	75
Guthrie, pond	75
Guymon, Frisco Creek	75
Lawton, Payette Pond	75
Okarche, pond	20
Walter, pond	75
Pennsylvania:	
Coolbaugh, Coolbaughs Pond	50
Hickory Run, Big Lake	100
Lake Harmony	100
Round Pond	100
Honesdale, Beech Lake	200
Paint Creek, Dark Shade Creek	100
South Dakota:	
Britton, Clear Lake	200
Mitchell, James River	300
Spencer, Kruse Pond	100
Texas:	
Alice, Artesian Lake	100
lake	50
Austin, pond	40
Blanket, pond	20
Brady, Live Oak Lake	40
Brownwood, lake	80
Bryan, Railroad Lake	80
Buda, Onion Creek	50
Caldwell, McArthur Pond	30
Channing, Cheyenne mill pond	70
Rita Blanco Creek	170
Cleburne, Johnsons Pond	20
Simpsons Pond	40
Coppell, Bullock Pond	30
Corsicana, Orphans' Home Pond	75
Crockett, Davy Crockett Lake	70
Fosters Lake	50
pond	40
Elgin, Austin Pond	50
Railroad Lake	50
ponds (3)	50
Elkhart, Elkhart Lake	200
Encinal, Lake La Palma	40
Gilmer, Bartons Pond	20
Goldthwaite, Isings Pond	40
Granbury, pond	60
Greenville, reservoir	100
Halletsville, ponds (3)	40
Henderson, Lake Surprise	40
lakes (2)	100
Smiths Pond	40
Hereford, Frio Creek	70
lake	39
ponds (2)	60
Terra Blanco Creek	100
Wamble Lake	109
Hubbard, lakes (2)	50
Willott Lake	70
Jacksonville, Park Lake	75
Jewett, pond	40
Kerens, pond	00
Laredo, ponds (6)	100
Lockhart, waterworks pond	24
Longview, Club Lake	50
Crappie—Continued.	
Texas—Continued.	
Longview, lake	50
Lake Thorne	50
Lufkin, pond	40
Lyons, Pietzsch Pond	30
ponds (3)	60
Manchaca, Onion Creek	50
Manor, pond	10
Marlin, pond	30
Marshall, Lake Bonita	100
Paw Paw Creek	40
Mertens, Thomas Lake	70
Navasota, lake	30
Railroad Lake	9
Oakwood, Stan Mise Lake	100
Palestine, Crystal Lake	150
Pessoney Lake	75
ponds (5)	75
Spring Park Lake	100
Pettus, pond	20
Proctor, pond	20
Rockwall, ponds (2)	30
Rusk, Penitentiary Reservoir	40
San Angelo, ponds (3)	80
San Antonio, ponds (3)	150
San Antonio River	50
West End Lake	50
Stone, Watson Lake	50
Sulphur Springs, pond	20
Pounds Lake	20
Taylor, Allisons Lake	20
Las Olmos Lake	40
waterworks pond	40
Temple, Lake Polk	100
Trenton, Stock Pool	20
Tyler, Greenbrier Lake	100
Lake Park Lake	170
Scotts Lake	30
Waco, Lake Eloise	100
Palmetto Lake	70
pond	40
Standefer Pond	40
Whitehouse, pond	20
Virginia:	
Ashburn, Broad Run	375
Catlett, Cedar Run	200
Gordonsville, Hickory Hill Pond	200
Martinsville, Rug Creek Pond	100
Orange, Meadow Farm Pond	100
Rockcastle, Fitch Mill Pond	225
Whitehall, Sleepy Hollow Pond	100
West Virginia:	
Buckhannon, Buckhannon River	180
Fairmont, Monongahela River	250
Parkersburg Shattucks Pond	100
Wisconsin:	
Augusta, Augusta mill pond	200
Dells Pond	300
Cassville, Mississippi River	25,000
Glenhaven, Mississippi River	50,000
Lynxville, Mississippi River	45,000
Total [a]	850,356
Strawberry bass.	
Georgia:	
Bullochville, Parhams Pond	190
Indian Territory:	
Kinta, Scotts Pond	65
Louisiana:	
Athens, pond	100
Blanchard, pond	100
Gloster, Graves Pond	100
Mansfield, Hewitt Pond	100
Marksville, pond	188
Mira, Grays Lake	150

[a] There were lost in transit 11,743 crappie.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Strawberry bass—Continued.	
Louisiana—Continued.	
Natchitoches, Cedar Hill Pond	50
lake	100
Lake Marie	100
Mississippi:	
Boonville, Boonville Lake	250
Guntown, pond	300
Macon, Howard Lake	300
Olive Branch, McCorgo Pond	1,000
Verona, Walkers Lake	700
Wenasoga, Willow Lake	300
Missouri:	
Joplin, pond	84
Lees Summit, Goodman Lake	900
Nevada, Lake Park Springs	1,000
Newburg, Little Piney Creek	800
Rolla, Stahr Pond	1,000
Springfield, Spring Pond	1,000
Texas:	
Elkhart, Elkhart Lake	150
Palestine, Coney Island Lake	100
Crystal Lake	100
Total [a]	9,236
Rock bass.	
Arkansas:	
Pike City, pond	100
Colorado:	
Alamosa, Hyatts Pond	100
Arriba, Inavale Lake	100
Georgia:	
Marietta, Split Rock Park Pond	107
Rome, head of Spring Creek	100
Madden Pond	100
Stone Mountain, pond	112
Walker County, Chickamauga Lake	400
Illinois:	
Aurora, Fox River	300
Greenup, Walden Pond	100
Hillsboro, Glen Pond	300
Maddox Lake	150
Milford, Silver Mere Lake	100
Raymond, pond	100
Indiana:	
Bloomington, quarry pond	100
Evansville, Stockers Pond	100
Greencastle, Stoners Pond	100
Huron, pond	100
Knightstown, Mitchell Pond	200
Kokomo, gravel pit	100
Lafayette, pond	100
Lebanon, Maple Pond	100
Loogootee, Walls Pond	100
Madison, Smith Pond	100
Marion, Andrews Pond	100
Morris, Bischoffs Pond	100
Mount Vernon, Wilkerson Pond	100
New Palestine, pond	100
Onward, Burris Pond	100
Sheridan, pond	100
South Bend, Updegraff Lake	200
Spiro, Derryberry Pond	150
Summitville, Hull Lake	150
Wadesville, Oliver Pond	100
Wawaka, pond	100
Indian Territory:	
Ardmore, Brown Lake	150
Rod and Gun Club's lake	250
Iowa:	
Donnellson, Bihns Pond	100
Eddyville, pond	100
Winterset, pond	100
Kansas:	
Athol, pond	75
Baker, pond	90

Species and disposition.	Fingerlings, yearlings, and adults.
Rock bass—Continued.	
Kansas—Continued.	
Belleville, pond	75
Blaine, pond	50
Bronson, Helm Pond	100
mill pond	100
ponds (5)	550
South View Pond	100
Cawker City, ponds (2)	150
Clifton, pond	100
Codell, pond	66
Coldwater, pond	100
Colby, ponds (2)	132
Collyer, Big Creek	75
Colony, pond	100
Columbus, pond	100
Comiskey, South Pond	50
Corliss, pond	100
Coyville, Spring Lake	100
Dresden, Johnson Pond	160
Garfield, Elys Pond	100
pond	100
Goodland, pond	100
Great Bend, ponds (5)	400
Gretna, pond	150
Hays, Haddock Pond	50
pond	225
Hiawatha, pond	90
Wolf Lake	90
Hill City, pond	66
Hutchinson, pond	100
Whetzell Pond	100
Jennings, Welton Pond	100
Kimbal, Roseland Reservoir	100
Kingman, pond	100
Snifly Pond	100
Lancaster, pond	90
Larned, ponds (3)	300
Lebanon, pond	50
Lecompton, pond	90
Lincoln Center, pond	70
Logan, ponds (2)	100
Long Island, pond	50
Manhattan, Allingham Pond	75
Merriam, pond	100
Montrose, pond	75
Moreland, pond	66
Norton, pond	75
Olathe, lake	100
Ottawa, Reynards Pond	100
Phillipsburg Wordermans Pond	75
Portis, pond	50
Prairie View, pond	50
Quinter, Big Creek Lake	75
Randolph, pond	75
Richmond, pond	100
Sawyer, pond	100
Spring Hill, pond	100
Vermillion, ponds (2)	100
Vliets, pond	50
Wakefield, pond	75
Wallace, reservoirs (2)	150
Wellsville, pond	100
Willis, pond	90
Kentucky:	
Allensville, ponds (2)	250
Anchorage, pond	100
Bardstown, waterworks reservoir	100
Burgin, Cox Pond	100
Thomas Pond	100
Corinth, Beard Pond	100
Cynthiana, pond	100
Frankfort, ponds (3)	300
Lebanon, Roaring Fork River	300
Lexington, Lake Ellerslie	100
London, pond	100
Louisville, Dicksons Pond	100
pond	100

[a] There were lost in transit 922 strawberry bass.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Rock bass—Continued.	
Kentucky—Continued.	
Marion, Tyner Pond	100
Maysville, Downing Pond	100
Morganfield, pond	100
Mount Sterling, Black Creek	300
pond	100
Olaton, Johnstons Pond	75
Owensboro, ponds (3)	300
Shelbyville, Spring Pond	100
Sonora, pond	100
Tonieville, pond	100
Walton, Armstrong Pond	100
Webbville, Forest Glen Pond	100
Louisiana:	
Homer, Ferguson Lake	200
Many, pond	100
New Orleans, Riverside Pond	200
Shreveport, Fairfield Pond	100
Maryland:	
Deer Park, pond	200
Frederick, pond	150
Rocky Ridge, Toms Creek	200
Mississippi:	
Ackerman, Woodward Pond	60
Alton, pond	180
Amory, pond	60
Baldwyn, Fish Lake	60
Bolton, City Pond	60
Horton Pond	60
ponds (3)	180
Boonville, Boonville Lake	300
Carpenter, Beech Pond	60
Centerville, McKies Pond	60
Corinth, Clear Creek	120
Morrison Mill Pond	60
Seven Mile Creek	120
Tuscumbia River	180
Vanderfords Mill Pond	60
Waukomis Lake	60
Crystal Springs, pond	60
Gloster, Cassels Pond	60
pond	60
Hazelhurst, Hampton Pond	60
Hilandale, Jones Pond	180
Lexington, Jordans Pond	60
Macon, Clements Pond	60
Clines Pond	60
Elkin Pond	90
Farmers Lake	69
Horse Shoe Lake	60
Howard Lake	90
Lomond Lake	60
pond	60
Muldon, Cunningham Pond	180
Olive Branch, Lee Pond	90
Red Lick, pond	60
Scooba, pond	60
Shuqualak, pond	60
Starkville, artificial pond	60
ponds (13)	780
Self Mill Pond	120
Toomsuba, Hurtts Ponds	60
Missouri:	
Atlanta, ponds (2)	200
Carthage, pond	100
Exeter, Yarnalls Pond	100
Labelle, pond	100
Neosho, pond	100
McMahons Spring	560
St. James, Meramec Springs	150
Nebraska:	
Danbury, pond	100
Hendley, Myers Pond	100
Lodgepole, Oberfelder Lake No. 3	200
St. Paul, pond	100
Utica, pond	150
Verdon, Wardena Lake	90
Rock bass—Continued.	
New Mexico:	
Ancho, ponds (2)	150
Columbus, Barley Ranch Pond	100
Deming, Hyatt Lake	75
Smyer Pond	75
Portales, Gleghorn Pond	75
Gregg Pond	75
Justice Pond	75
mill pond	75
Pinron Pond	75
ponds (7)	525
Stinnett Pond	75
Stone Pond	75
Roswell, pond	75
New York:	
Troy, pond	150
North Carolina:	
Bostic, Freemans Pond	100
Gastonia, Loray Pond	128
Ohio:	
Barberton, pond	100
Hanover, McKnight Pond	100
Lancaster, pond	100
Oak Hill, pond	100
Sardinia, pond	100
Willoughby, pond	150
Yelverton, Liles Pond	100
Oklahoma:	
Blackwell, pond	100
Comanche County, Barnard Lake	100
Comanche County, Hendricks Pond	100
Dover, pond	50
Elk City, ponds (2)	200
Guthrie, pond	75
Homestead, Howerton Pond	150
Kingfisher, pond	150
Lawton, pond	50
Weaver Spring Lake	50
Okarche, pond	100
Weatherford, Coffey Creek	100
Pennsylvania:	
Allegheny, Decker Ponds	400
Arcola, Perkiomen River	300
Myerstown, Little Swatara Creek	170
Penllyn, pond	100
Phœnixville, French Creek	200
Pickering Creek	200
Pigeon River	200
Royal Spring Creek	200
Stoney Run	200
Whitehaven, Long Pond	300
South Dakota:	
Broadland, Artesian Pond	150
Faulkton, pond	200
Ferney, pond	100
Groton, pond	100
Nemo, Robinson Pond	100
Woonsocket, Davis Pond	200
Tennessee:	
Beans Station, Round Pond	120
Bryant, pond	104
Chattanooga, Chickamauga Creek	240
Crawfish Spring	240
Columbia, Ladd Pond	104
Concord, Calloway Pond	100
Henry, Caton Pond	90
Lone Mountain, pond	100
Louisville, French Pond	100
Newport, Holbert Pond	100
Niota, Harmond Pond	100
Philadelphia, Cannon Pond	100
Portland, Deming Pond	104
Selmer, Cypress Pond	60
pond	60

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Rock bass—Continued.	
Texas:	
Alice, pond	125
Alpine, pond	75
Alto, Crusterner Pond	100
Amarillo, Donaldson Pond	120
Bassett, pond	75
Bedias, pond	75
Bell Branch, Railroad Lake	100
Benavides, pond	50
Blanket, Turner Pond	50
Brownwood, Brownwood Lake	150
Smith Lake	150
Willis Lake	150
Williams Lake	150
Bryan, Cavitt Pond	100
Railroad Lake	25
Burton, Fuchs Pond	125
Calvert, pond	100
Canyon City, pond	75
Terra Blanco River	100
Celina, lake	125
Channing, pond	100
Chapel Hill, pond	100
Chillicothe, Bray Pond	100
Clarendon, pond	200
Coleman, artificial ponds	200
Home Creek	300
Corpus Christi, Shannon Pond	150
D'Hanis, pond	100
Dalhart, Dawson Pond	50
ponds (5)	450
Dawson, Oil Mill Pond	125
Falfurias, lake	100
Forney, Davis Pond	150
Spellman Lake	150
Fort Worth, pond	100
Franklin, pond	100
Ganahl, Stoneleigh Pond	75
Gonzales, Maurin Quarry Pond	75
Goodnight, pond	100
Grandbury, pond	100
Grapevine, pond	125
Hebbronville, Benton Lake	100
Hempstead, Clear Creek	125
Hannay Lake	75
Le Grand Pond	120
Hereford, ponds (6)	475
Rock Lake	300
Slover Pond	30
Hubbard, ponds (2)	225
Irene, Railroad Lake	100
Kerrville, pond	75
Kingsville, Johnstons Reservoir	175
Lampasas, Sulphur Fork of Lampasas River	300
Laredo, Ygnacio Pond	100
Lufkin, pond	100
Marshall, Katrine Pond	150
Mart, Railroad Lake	100
Mount Pleasant, pond	75
Navasota, Railroad Lake	25
Otto, Gill Pond	225
Palestine, Crystal Lake	50
pond	100
Pearsall, Hess Pond	75
Penelope, Railroad Lake	100
Pittsburg, pond	200
Proctor, pond	100
Roans Prairie, Cuthrell Pond	150
Williamson Pond	125
Rockd[illegible], Flake Pond	75
Sabinal, Durham Pond	100
Oak Hearst Pond	75
San Antonio, San Antonio River	200
ponds (2)	100
West End Lake	277
Rock bass—Continued.	
Texas—Continued.	
Seguin, Battle Ground Pond	55
Sommerfield pond	100
Spofford, pond	50
Stockdale, ponds (2)	150
reservoir	75
Stratford, Green Pond	75
Hill and Ashbrook ponds	100
ponds (11)	780
Spurlock Pond	75
Sulphur Springs, Carter Lake	125
Electric Light Lake	125
pond	75
Terrell, Brin Pond	100
Griffith Lake	120
Jordan Pond	200
Uvalde, pond	75
Walling, pond	200
Wawaka, pond	75
Waxahachie, pond	75
Weaver, Allen Pond	75
Utah:	
Cove, pond	100
Virginia:	
Charlottesville, Busbys Pond	200
Crewe, pond	100
Edinburg, Stony Creek	300
Ellerson, Bates Pond	200
Luray, pond	100
Maiden, pond	150
Petersburg, Branders Pond	200
Princess Anne, Brickhole Pond	100
Pulaski, Martin Pond	100
Red Hill, pond	300
Remington, Rappahannock River	300
Richmond, Custis Mill Pond	750
Dearheart Pond	300
Steels Tavern, Marl Creek Mill Pond	100
Sweet Hall, Lees Mill Pond	300
Wytheville, Reed Creek	10,105
West Virginia:	
Dingess, pond	100
Hinton, ponds (2)	250
St. Alban, pond	150
Total[a]	58,099
Warmouth bass.	
Alabama:	
Allenton, pond	600
Garland, Bonanza Pond	600
Georgia:	
Albany, Flint River	400
Arlington, Ichawaynochaway Creek	400
Leary, Cordray Mill Pond	200
Total	2,200
Small-mouth black bass.	
Connecticut:	
Kent, Housatonic River Pond	200
Norfolk, Togey Pond	498
Georgia:	
Box Springs, Lake Mohignoc	100
Raleigh, Cane Creek	100
Indiana:	
Cedar Lake, Cedar Lake	2,000
Lake Park, Bass Lake	2,000
Massachusetts:	
Plymouth, Great South Pond	1[illegible]5
Long Pond	[illegible]95
Smiths Ferry, Connecticut River	[illegible]8[illegible]

[a] There were lost in transit 10,234 rock bass.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Small-mouth black bass—Continued.	
Massachusetts—Continued.	
Southbridge, Hatchet Lake	200
Webster, Chanbunagungamauyg Lake	200
Woburn, Horn Pond	300
Michigan:	
Birmingham, Black Walnut Lake	5,000
Island Lake	5,000
Long Lake	5,000
Wing Lake	5,000
Brighton, Mont Lake	5,000
Clarion, Walloon Lake	1,000
Corunna, Shiawassee River	5,000
Doster, Pine Lake	5,000
Frankfort, Crystal Lake	500
Gladwin, Lound Lake	5,000
Grand Haven, Spring Lake	5,000
Hudson, Mallory Lake	2,000
Jackson, Clarks Lake	5,000
Wolf Lake	500
Kalamazoo, White Lake	990
Leslie, Pleasant Lake	5,000
Lincoln, Clear Lake	5,000
Lupton, Sage Lake	5,000
Mattawan, Wheeler Pond	500
Northville, Walled Lake	1,000
Paw Paw, Sand Lake	970
Pellston, Douglas Lake	500
Tuttle Lake	500
Pentwater, Pentwater Lake	5,000
Pentecost, Sand Lake	1,000
Pontiac, Cass Lake	500
Elizabeth Lake	5,000
Yorkville, Gull Lake	5,000
New Hampshire:	
Cheshire County, Cheshire Place Pond	250
North Carolina:	
Canton, East Fork of Pigeon River	1,000
Ohio:	
Lancaster, Beck Pond	1,975
Portsmouth, Brush Pond	1,965
Wickliffe, Jones Pond	1,960
Pennsylvania:	
Gettysburg, Marsh Creek	200
Hollidaysburg, Juniata River	50
Rhode Island:	
Rhode Island Fish Commission, Providence	400
South Carolina:	
Spartanburg, city reservoir	38
Tennessee:	
Gunn, East Fork Sugar Creek	70
Mockeson Creek	70
West Fork Sugar Creek	70
Knoxville, Pigeon River	1,000
McMinnville, Caney Fork River	76
Maryville, Crooked Creek	594
Ellijay Creek	594
Little River	593
Nails Creek	594
Murfreesboro, Stones River	875
Nashville, Cumberland River	1,560
Vermont:	
Groton, Groton Pond	400
South Londonderry, West River	900
Virginia:	
Dunlop, Swift Creek	150
Providence Forge, Providence Forge Lake	300
Strasburg, North Branch of Shenandoah River	7,500
Wytheville, Reed Creek	10,009
Washington:	
Lakeview, American and Gravelly lakes	1,935
West Virginia:	
Keyser, Pattersons Creek	15,000
Montrose, Leading Creek	15,000
Romney, South Branch of Potomac River	15,300
Uflington, Monongahela River	14,900
Total[a]	191,665
Large-mouth black bass.	
Alabama:	
Andalusia, ponds (2)	1,000
Anniston, Oxford Lake	500
Asheville, Williams Pond	500
Atmore, Boone Pond	500
Belle Ellen, Cahaba River	2,000
Blocton, Schultz Creek	800
Brent, Haysop Creek	1,000
Brierfield, Little Cahaba River	2,000
Cedar Bluff, Chattooga River	4,000
Choccolocco, pond	500
Demopolis, pond	500
Winns Pond	500
Drewry mill pond	200
Epes, Hilman Pond	470
Spring Pond	740
Williams Pond	464
Gadsden, Big Mills Creek	2,000
Gantt, Gantt Pond	2,000
Greenville, pond	500
Guin, Faris Pond	300
Healing Springs, Causey Pond	200
Inverness, mill pond	700
pond	500
Jackson, Warren Pond	800
Jacksonville, Germania Spring	500
Jasper, Clear Creek	3,000
Kingston, Kingston Mill Pond	600
La Pine, Enzor Pond	800
Lanford Pond	800
Leesburg, Terrapin Creek	1,700
Livingston, Lee Place Pond	500
Montgomery, Electric Pond	1,200
pond	800
Oxford, Mountain Creek	1,000
Ozark, pond	300
Pell City, Broken Arrow Creek	2,000
Pink, Springhead Pond	1,800
Pleasant Gap, Hurricane Creek	2,000
River Falls, Caton Pond	500
Round Mountain, Yellow Creek	500
Russellville, Spring Branch	1,000
Seale, Bentons Pond	1,000
Holland Pond	800
Phillips Lake	1,000
Seale Lake	1,200
Selma, Iver Lake	500
Kenan Pond	1,000
Moore Pond	500
Schuh-Miller Pond	1,300
Shelby, Kewahatchie Spring	500
Spring Garden, Mill Creek	1,500
Tallassee, Burt Mill Pond	500
Troy, Ross Pond	500
Watkins Pond	500
Vinegar Bend, Vinegar Bend Pond	200
Wagar, Grindle Hole Lake	500
Warrior, Black Warrior Creek	1,000
Wharton, pond	500
White Oak Springs, Bishop Mill Pond	800
Whitney, mill pond	1,000
Teague Pond	200
Yantley, Phillips Pond	600
Arizona:	
Flagstaff, Lake Mary	100
Morenci, Eagle River	250

[a] There were lost in transit 547 small-mouth black bass.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Arizona—Continued.	
Prescott, Granite Dells Pond	100
Safford, pond	100
Solomonsville, pond	100
Williams, railroad pond	100
Arkansas:	
Alma, Big Frog Creek	500
West Fork of White River	800
Arkadelphia, Ouachita River	3,000
Ashdown, Pine Prairie Lake	500
Town Pond	500
Batesville, White River	300
Berryville, Osage River	200
El Dorado, artificial lake	100
ponds (2)	350
Greenwood, Vachegras Creek	150
Higginson, Richland Creek	1,200
Lafe, Harvey Lake	500
Lake Village, Lake Chicott	300
Malvern, Carmichaels Mill Pond	800
Clem Lake	300
Harps Lake	300
Ouachita River	300
Stanleys Pond	500
Mansfield, brickyard pond	150
Morrilton, lake	300
Rogers, Maxwell Pond	75
St. Paul, White River	200
Scott, Old River Lake	1,300
Spinola, saw mill pond	100
Thompson, Lallars Creek	666
White River	334
Colorado:	
Boulder, Twin Lakes	150
Grand Junction, Grand and Gunnison rivers	300
Mancos, Bauer Reservoir	150
Olney, Lewis Reservoir	200
Windsor, Windsor Lake	200
Connecticut:	
Chester, Slater Pond	100
Coscob, pond	100
Goodspeeds, Bashan Lake	300
New Haven, Colonial Lake	100
Norwalk, pond	100
Shelton, Housatonic River	350
Waterbury, Hitchcocks Pond	200
Delaware:	
Harrington, Boons Mill Pond	350
Milford, Silver Lake	250
Milton, Paynters Pond	150
Delaware Fish Commission, Wilmington	600
District of Columbia:	
Washington, fish ponds	200
Florida:	
Sanford, Lake Monroe	3,500
Georgia:	
Ashburn, pond	800
Augusta, Augusta Game Preserve Club Pond	1,500
Carmichaels Fishing Club Pond	1,200
Jones Pond	2,000
Columbus, Garrards Pond	200
Crawfordville, Chapmans Creek	1,000
Jordan Mill Pond	800
Little River	1,000
Ogeechee River	2,000
Dalton, Crystal Lake	1,000
Greensboro, Champion Pond	500
Hampton, Edwards Pond	1,200
Jonesboro, Flint River Pond	800
Mundys Mill Pond	1,200
Ringgold, Chickamauga Creek	1,000
Sycamore, ponds (2)	1,700
Tilton, mill pond	1,200
Upatoie, Jenkins Pond	500
Large-mouth black bass—Continued.	
Georgia—Continued.	
Walker County, Chickamauga Lake	100
Walker County, Crawfish Springs	1,300
Illinois:	
Albion, brickyard pond	100
Anna, Fair Ground Lake	100
Antioch, Long Lake	150
Lake Marie	150
Aurora, Fox River	1,000
Barrington, pond	190
Belvidere, Kishwaukee River	400
Blanding, Mississippi River	1,000
Carbondale, Greathouse Lake	150
Chicago, South Park lakes	600
West Park lakes	1,000
Collinsville, brickyard pond	100
Crystal Lake, Crystal Lake	390
Decatur, lake	300
Deer Park, Emerald Lake	195
Des Plaines, pond	95
Du Quoin, pond	75
East Dubuque, Mississippi River	2,000
Edwardsville, Mirror Lake	150
Fairbury, Munz Sand Pit	500
Freeburg, Freeburg Lake	300
pond	100
Galena, Mississippi River	4,000
Glenellyn, ponds (2)	300
Grays Lake, Grays Lake	200
Hillsboro, Bliss Lake	100
city reservoir	200
Hillsboro Lake	200
lake	150
pond	100
Seymour Pond	450
Johnson City, Richerson Pond	200
Joliet, ponds (3)	800
quarry pond	400
Lone Tree, Lone Tree Lake	200
Long Lake, Long Lake	250
Millstadt, Eckert Pond	100
Millers Pond	100
Wirth Pond	100
Naperville, Glen Lake	200
Oneida, Thayers Lake	100
Oswego, Fox River	290
Ottawa, pond	295
Princeville, Spring Pond	100
Raymond, pond	75
Rockefeller, Diamond Lake	200
Round Lake, lake	250
Salem, Deer Lick Pond	200
ponds (2)	50
Savanna, Mississippi River	4,500
Seneca, pond	195
Sheridan, pond	290
Smithboro, lakes (2)	75
Waverly, pond	150
Wheaton, Butterfield Lake	200
Indiana:	
Albion, Long Lake	600
Anderson, Westbrook Pond	200
Aurora, South Hogan Creek	200
Bloomington, stone quarry pond	100
Boonville, Cypress Creek	400
Hooppole Creek	200
Little Pigeon Creek	750
Camden, Deer Creek	300
Cedar Lake, Cedar Lake	298
Converse, pond	150
Corydon, Grables Pond	150
Culver, Lake Maxinkuckee	6,900
Cutler, Wild Cat River	300
Delphi, Wabash River	200
Dillsboro, pond	100
Elkhart, St. Joseph River	450
Evansville, brewery pond	100

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Indiana—Continued.	
Evansville, brickyard pond	75
Country Club Lake	800
Schmadels Pond	75
Stringtown Springs	100
West Heights Park Lake	150
Wimberg Pond	100
Fairmount, Jones Pond	100
Fort Wayne, Lake Everett	200
Round Lake	200
Spring Lake	200
Wayne Lake	150
French Lick, French Lick Springs Reservoir	400
Gosport, West Branch White River	300
Henryville, Norris Pond	100
Kewanna, Bruce Lake	200
Knightstown, Hillside Pond	175
Lafayette, Millers Pond	50
Lake Cicott, Lake Cicott	595
Ligonier, Diamond Lake	200
Lucerne, Fletchers Lake	200
Mishawaka, St. Joseph River	295
Monticello, Tippecanoe River	590
Muncie, Anderson Pond	100
New Albany, Falling Run	225
Farnsley Pond	150
Silver Hill Pool	100
Silver Creek and Silver Lake	375
New Carlisle, Hudson Lake	290
Oakland City, lake	200
ponds (2)	400
waterworks lake	75
Osceola, St. Joseph Mill Pond	295
Pendleton, Fall Creek	400
Portland, lake	150
Ridgeville, Pequameha Lake	250
Rolling Prairie, Prairie Lake	268
Shelburn, mining company's lake	100
Sullivan, Mildred Lake	100
Terre Haute, Warren Park Lake	200
Tipton, pond	72
Union City, gravel pit	150
Walcott, Pine Grove Pond	100
Wawasee, Wawasee Lake	600
Williamsport, Wabash River	250
Winamac, Chapman gravel pit	100
Windfall, Wild Cat Creek	190
Indian Territory:	
Antlers, pond	100
Ardmore, A. & C. Lake	200
Caddo Creek	400
Chickasaw Lake	350
Choctaw Lake	300
City Lake	150
Moores Pond	150
Pittmans Bayou	150
Swan Lake	150
Comanche, brickyard pond	100
Wilsons Pond	100
Duncan, Weaver Lake	100
Marlow, Burkes Pond	100
Klondyke Pond	150
mill pond	175
Spring Lake	175
Minco, Campbells Lake	100
pond	150
Poteau, Long Lake	500
Roff, Blue River	200
Sapulpa, Rock Creek	150
South McAlester, waterworks pond	4,750
Spiro, La Flure Pond	500
Sulphur, lake	100
Tishomingo, Deep Water Lake	100
Large-mouth black bass—Continued.	
Indian Territory—Continued.	
Vinita, Lynchs Lake	225
pond	150
White Lake	150
Wimer Lake	150
Welling, Barren Fork of Illinois River	3,100
Wynnewood, Rod and Gun Club Lake	150
Iowa:	
Bellevue, Mississippi River	200
Bussey, Way Pond	100
Calmar, Big Turkey River	1,000
Cedar, pond	150
Cedar Falls, Cedar River	300
Charles City, Cedar River	5,000
Chester, pond	200
Upper Iowa River	14,000
Clarinda, lake	250
Clayton, Mississippi River	2,000
Clear Lake, Clear Lake	7,400
Council Bluffs, Lake Manawa	1,350
Cresco, Big Turkey River Mill Pond	300
Decorah, Badger, Beaver, Canoe, Coldwater, and Ten-Mile creeks	600
Dubuque, Mississippi River	1,500
Fairfield, Water Works Lake	5,000
Gordons Ferry, Mississippi River	2,200
Gravity, pond	125
Green Island, Mississippi River	1,000
Grinnell, artificial lake	250
Hawkeye, Alpha Mill Pond	300
Henderson, pond	150
Humeston, artificial pond	150
Iowa Falls, Iowa River	3,000
Jefferson, Raccoon River	250
Kensett, Shell Rock River	200
Lainsville, Mississippi River	2,000
Lime Springs, Upper Iowa River	400
Manchester, Maquoketa River	12,000
New Hampton, Little Cedar Creek	300
Norman, Silver Lake	300
North McGregor, Mississippi River	1,500
Northwood, Shell Rock River	7,300
Silver Lake	200
Numa, pond	75
St. Ansgar, Cedar River	500
Smith Ferry Mississippi River	1,000
Stuart, pond	100
Tipton, Godden Pond	100
Wadena, Volga River	5,000
Washington, Highland Park Lake	100
Waterloo, Cedar River	6,000
Waucoma, Little Turkey River	200
Waverly, Garner Pond	100
West Liberty, Crystal Lake	150
Potters Pond	150
Winterset, Shaws Pond	125
Winthrop, Wapsipinicon River	7,000
Kansas:	
Abilene, Bass Lake	75
Barclay, pond	100
Blue Rapids, Big and Little Blue rivers	350
Box Springs, Willow Creek	150
Braziltou, pond	100
Bronson, County Pond	75
ponds (2)	225
Burdett, Pawnee River	200
Carlos, artificial pond	100
Holland Lake	150
Cawker City, lake	100
Cedar Point, Cedar Creek	200

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Kansas—Continued.	
Cherryvale, Drum Creek	200
Coldwater, Middle Kiowa Creek	200
Spring Creek	250
Council Grove, Neosho River	200
Cunningham, pond	150
Denison, Rock Dam	100
Dodge City, Buckner Creek	200
pond	100
Dwight, pond	100
Englewood, Antelope Creek	150
Formosa, Libhart Pond	75
Garden City, artificial pond	100
Garden City Pond	100
ponds (7)	700
reservoir	100
Garnett, Cedar Creek	200
Geneseo, railroad pond	200
Great Bend, Pawnee Lake	150
Walnut Creek	250
Gypsum, Kings Pond	50
Halstead, Little Arkansas River	300
Hays City, pond	100
Hiawatha, Fairchild Pond	100
Hill City, ponds (2)	150
Horton, Spring Creek	150
Hutchinson, Cow Creek	200
Glendale Pond	100
Jetmore, Pawnee River	150
Jewell City, Fays Pond	80
Kendall, pond	75
Kinsley, pond	150
Lakeview, Baldwins Lake	200
Lakin, Blue Grass Pond	100
Fulmer Pond	100
Langdon, Lillian Lake	100
Larned, Pawnee River	475
Peterson Pond	100
Prairie Dell Pond	100
Leavenworth, Bass Lake	100
Lebanon, pond	50
Leoti, Beaver Creek	100
pond	100
Leroy, Neosho River	200
Lincoln Center, Oak Creek	310
Logan, ponds (2)	175
Lyndon, Salt Creek	200
Macksville, ponds (2)	75
Wild Horse Pond	50
Manhattan, Berrys Pond	75
Big Blue River	150
Blaine Creek	100
Carnahan Creek	100
Cedar Creek	75
Clarke Creek	50
Clear Creek	100
Collister Pond	50
Dempsey Lake	25
Elbow Creek	100
Eureka Lake No. 1	100
Eureka Lake No. 2	75
Eureka Lake No. 3	125
Finnley Lake	50
Fuller Creek	100
Godwin Creek	100
Gohen Slough	100
Huse Reservoir	25
Kaw River	100
Kings Creek	100
Lee Creek	50
Lower Deep Creek	100
McDonald Lake	50
McDowell Creek	225
McIntyres Creek	50
Mill Creek	100
Murdock Lake	25
Pfial Creek	100
Pillsbury Pond	25
pond	25
Large-mouth black bass—Continued.	
Kansas—Continued.	
Manhattan, Robinson Lake	50
Silver Creek	100
Seven Mile Creek	100
Story Lake	25
Sweet Creek	150
Tuttle Creek	100
Upper Cedar Creek	75
Upper Deep Creek	100
Warners Pond	25
Wild Cat Creek	150
Mankato, Rock Island Pond	50
Montrose, pond	70
Morland, pond	70
Morrowville, pond	50
Mound City, Little Sugar Creek	200
Muncie, Turkey Creek	70
Neodesha, Verdigris Creek	300
Neosho Falls, Neosho River	200
Ness City, Sunset Lake	105
Newton, ponds (4)	605
Nickerson, pond	150
Olathe, Big Cedar Creek	200
Hadleys Lake	105
Lake Como	150
Lake Gladys	100
Osage City, Chisham Pond	75
Pleasant View Pond	100
Osawatomie, Pond No. 8	100
Osborne, South Fork Solomon River	150
Paola, Bull Creek and Marais des Cygnes River	300
Wea River	300
Paxico, Mill Creek	150
Peabody, Doyle Creek	200
Spring Creek	200
Pleasanton, pond	100
Prairie View, pond	50
Pratt, Ninnescah River	200
Kansas Fish Commission	200
Prescott, pond	100
Randall, pond	80
Roberts, Siegfried Pond	150
Salina, mill pond	75
St. Francis, pond	125
St. John, Rattlesnake Creek	50
Scott, Beaver Creek	300
Spring Creek	150
Sharon Springs, Bluff Springs Pond	125
Syracuse, Herndon Reservoir	100
Toronto, Toronto Lake	75
Wakeeney, Allbright Pond	125
Wamego, lake	150
Rock Creek	400
Washington, Mill Creek	100
Weir, pond	50
Scranton Pond	50
Wellington, Slate Creek	200
Woodston, pond	50
Venda, Hagus Lake	150
Kentucky:	
Adairville, Bell River	300
Allensville, Gills Lake	100
Hughes Pond	75
mill pond	75
Moseley Lake	150
ponds (3)	400
Anchorage, Cox Pond	150
Bardstown, waterworks reservoir	200
Beattyville, Kentucky River	250
Burgin, Cox Pond	125
Hawkins Pond	100
Millers Pond	100
Oliver Pond	100
Stone Pond	100
Burnside, Cumberland River	500

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Kentucky—Continued.	
Butler, Willow Lake	75
Cadiz, Little River	400
Campbellsville, Willocks Lake	100
Clark, pond	150
Earlington, Loch Mary Lake	400
Early Times, Beam Pond	100
Ekron, pond	100
Elkton, pond	100
Eminence, Grennon Creek	375
Falmouth, Ewing Lake	100
Frankfort, Elkhorn River	300
Quarles Pond	75
Smither Pond	100
Franklin, Red Pond	100
Glendale, pond	90
Highland Pond	90
Greensburg, Perkins Pond	150
Henderson, pond	200
Hartmann Pond	100
Hodgensville, Davenport Pond	125
ice pond	150
Kenneday Pond	150
Walters Pond	150
Hopkinsville, Leaford Pond	100
Little River	300
Hunters, Distillery Pond	125
Jackson, Kentucky River	300
Lancaster, Lake Placid	150
Robinson Lake	75
waterworks lake	125
Lebanon, Roaring Fork River	350
Lexington, Reservoir No. 3	575
Louisa, Big Sandy River	300
Louisville, reservoir	400
Ludlow, Ludlow Lagoon	200
Madisonville, Monarch Pond	125
Victoria Pond	125
Mayfield, pond	75
Millersburg, Hinkston River	300
Mount Sterling, Anderson Lake	100
Donaldson Creek	200
Fox Pond	150
Grassy Lick Creek	200
Greenbrier River	200
Hameline Pond	100
Little Slate Creek	200
Morris Lake	150
Slate Creek	400
Spencer Creek	200
Spratts Pond	150
waterworks reservoir	150
Whitsett Lake	300
Newport, Maple Pond	150
Nolin, Duvall Pond	90
Olmstead, Cottonwood Pond	150
pond	100
Whipporwill Creek	150
Willow Pond	200
Paint Lick, pond	75
Paris, Alexander Pond	100
Clay Pond	100
Green Creek	200
Hinkston Creek	200
Houston Creek	200
pond	100
Stoner Creek	200
Strodes Creek	200
Paynes, Elkhorn Creek	200
Pembroke, Leavell Pond	125
Peru, Tuford Pond	150
Pewee Valley, Kice Lake	175
Richmond, ponds (2)	200

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Kentucky—Continued.	
Richmond, Lake Reba	300
Rineyville, ponds (2)	250
Ryland, lakes and ponds	200
St. Marys, Brown Forman Pond	150
Silver Creek, pond	100
Sonora, Jones Pond	90
Lamptons Lake	90
Masons Pond	90
Sparta, Eagle Creek	500
pond	150
Sanford Pond	150
Springfield, pond	200
Springfield Lake	400
Stanford, waterworks reservoir	500
Stanton, Red River	300
Trenton, Smith Pond	250
West Fork of Red River	200
Vanceburg, Kinniconick River	400
Versailles, Childers Pond	175
Dufort Pond	100
Hifner Pond	100
pond	100
Wellsburg, North Fork of Licking River	300
Williamstown, New Lake	100
Wilmore, Lowry Pond	150
Winchester, Big Stoner Creek	500
lake	150
Reed Lake	150
waterworks lake	550
Worthville, pond	150
Louisiana:	
Athens, Marsalis, and Gaudy Pond	150
Baton Rouge, Island Lake	150
Calhoun, lake	100
Coushatta, Corley mill pond	200
Smith Pond	100
Gloster, Burford Pond	100
Hackley, Bogue Chitto River	300
Keithville, Red Bayou	200
Kingston, mill pond	100
Scott Pond	100
Marksville, ponds (2)	300
Natchitoches, Chaplins Lake	200
lake	200
Lake Brezeale	150
Lake Marie	200
Parker Place Pond	150
Scarborough Lake	200
Shreveport, Lake Hayes	600
pond	150
Slidell, Holt Pond	200
Urania, mill pond	150
Winnfield, Crawfords Pond	100
Wisner, Cut-Off Bayou	150
Maine:	
Poland, Range Ponds	300
Maryland:	
Big Pool, Big Pool	400
Elkton, Freemans mill pond	600
Funkstown, Antietam Creek	700
Hancock, Potomac River	1,250
Montgomery County, Patuxent River	300
New Windsor, Dickinson Run	200
Rawlings, North Branch of Potomac River	1,300
Rising Sun, Octorara Creek	200
Riverdale, Eastern Branch of Potomac River	300
Rocky Ridge, Monocacy River	600
Westminster, Winters mill pond	100

Details of Distribution—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Massachusetts:	
New Bedford, Jobs Neck Pond	200
Pittsfield, Onota Lake	150
Pontoosuc Lake	150
Michigan:	
Albion, Winnipeg Lake	150
Channing, Sawyer Lake	300
Clare, Clear Creek	150
Dewey Pond	150
Little Tobacco Creek	150
Mater Lake	150
Tobacco Creek	200
Crystal Falls, Fortune Lake	400
Edwardsburg, Pleasant Lake	200
Greenville, Turk Lake	200
Iron Mountain, Bat Lake	200
Horseshoe Lake	200
Lake Antoine	200
Sidnaw, Bergland Lake	200
Sparta, Camp Lake	200
Vulcan, Lake Hanburry	200
Watersmeet, Clark Lake	300
Crooked Lake	300
Duck Lake	300
Thousand Island Lake	300
Minnesota:	
Chisago, Lake Chisago	275
Deerwood, Lake Reno	1,000
Duluth, Eagles Nest Lake	525
Schells Lake	200
Eveleth, Ely Lake	200
Fergus Falls, Wall Lake	200
Groningen, Crystal Lake	275
Lincoln, Fish Trap Lake	200
Little Falls, Alexander Lake	150
lake	200
Nickerson, Oak Lake	450
Ortonville, Big Stone Lake	200
Osakis, Osakis Lake	200
Oshawa, Middle Lake	300
Saginaw Station, Grand Lake	200
St. Peter, Lake Emily	200
Lake Jefferson	200
Lake Washington	200
Mississippi:	
Abbeville, Graham Lake	100
Aberdeen, Horseshoe Lake	150
Irvin Lake	150
Ackerman, pond	75
Woodward Pond	75
Bolton, Gin Pond	150
Lakeview Pond	200
mill pond	150
ponds (2)	300
Robinson Pond	150
Williams Pond	150
Bogue Chitto, pond	100
Booneville, Bobbie Smith Lake	400
Brookhaven, Decell Pond	100
Simpson Mill Pond	100
Canton, pond	100
Carpenter, Beech Lake	75
Centerville, pond	75
Hagaman Pond	125
Clinton, Bogue Chitto Creek	150
pond	150
Coahoma, Moon Lake	300
Coffeeville, Durden Creek	200
Columbus, Tombigbee River	350
Crenshaw, Delta Pond	100
Edwards, Barber Pond	150
Enterprise, Kamper Pond	200
Gallman, Gallman Pond	75
Gloster, Wagoners Creek	150
Walker Branch	75
Walker Creek	150
Hazelhurst, bass pond	75
Large-mouth black bass—Continued.	
Mississippi—Continued.	
Hazelhurst, lake	75
Hampton Pond	75
Long Island Pond	75
Pleasant Pond	75
Slay Pond	75
Helm, pond	100
Highlandale, Mose Lake	275
Indianola, Bay Lake	150
Isola, Martin Lake	150
Laurel, Knights Mill Pond	150
Liberty, pond	100
Lorman, ponds (3)	400
Macon, Big Lake	150
pond	100
Magee, Burnam Pond	75
pond	75
Purvis Pond	75
Meridian, Live Lake	175
Merrill, mill pond	100
Michigan City, pond	800
Miller, Coldwater River	150
New Albany, Catahoula Lake	600
Foley Pond	400
Ratliff Pond	600
Tippah Pond	400
Newton, pond	150
Russells Mill Pond	150
Smith Mill Pond	150
Quitman, Rolling Creek Mill Pond	500
Rienzi, Holts Lake	400
Ripley, Pearce Pond	300
Rucker Pond	300
Rockwall, Hatchie Pond	100
Scooba, ponds (3)	300
Sessums, ponds (2)	250
Shuqualak, pond	100
Starkville, Josey Mill Pond	75
McPherson Lake	150
mill pond	75
Pearson Pond	75
ponds (5)	375
Vernon Pond	75
Tomnolen, lake	150
Tunica, McKinney Lake	200
Verona, Lake Walka	400
Vossburg, Eucutta Pond	100
Wenasoga, Willow Lake	700
West Point, Moseley Pond	100
ponds (2)	300
Winchester, Meador Lake	200
Missouri:	
Aurora, Crane Lake	150
Boaz, Meramec River	300
Brookline, Wilson Creek	500
Clapper, Bick Pond	100
Railroad Pond	100
Cuba, pond	500
Culverton, Culver Pond	150
Golden City, pond	500
Greenwood, Hillcrest Lake	150
Humansville, Embray Pond	100
Independence, Dickinson Lake	1,000
Iron Mountain, Iron Mountain Lake	1,000
Jasper County, North Fork Spring River	200
Jefferys, pond	300
Joplin, Buffalo Pond	300
Kansas City, Stark Lake	150
Mansfield, lake	100
Miller, Spring Lakes	500
Nevada, Ewing Pond	150
K. P. Allen Reservoir	600
Neosho, Crescent Pond	300
Pratt City, Richland Lake	1,000
Randolph, Furber Pond	100

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Missouri—Continued.	
St. Louis, Bell Point Creek	300
Louisiana Purchase Exposition	21
Springfield, Elfindale Lake	100
Sac River	200
Versailles, Spring Lake	150
Montana:	
Chester, Bourne Reservoir	200
lake	150
Strode Lake	150
Kalispell, Bowser Lake	200
Helena, Lake Sewell	300
Nebraska:	
Beaver City, Beaver Creek	400
Cedar Creek, Atwoods Sand Pit	200
Cedar Creek Lake	200
Fremont, Idlewild Lake	200
Gordon, Claymore Pond	150
Indianola, Loomis Pond	150
Lodge Pole, Oberfelder Lake No. 1	188
Oberfelder Lake No. 2	187
Oberfelder Lake No. 5	187
Oberfelder Lake No. 6	188
Ord, North Loop Creek	400
Palisade, Brough Lake	300
Rushville, Pine Creek	300
Seymour Park, Lake Seymour	500
New Jersey:	
Blackwood, Blackwood Lake	150
Bloomfield, Verona Lake	200
Hopatcong, Hopatcong Lake	400
Lakehurst, Horicon Lake	200
Longbranch, Tintern Lake	200
New Egypt, Oakford Lake	150
Newfoundland, Green Lake	200
Oakridge, Pequannock River	200
Sewell, Sunset Lake	150
Sussex, Lake Rutherford	200
Swartzwood, Big Swartzwood Lake	200
Williamstown, Fries Pond	150
McClures Pond	150
Woodbury, Keans Pond	150
New Mexico:	
Ancho, pond	120
Clayton, North Lake	150
Dexter, Townsley Reservoir	75
Las Vegas, Lake Chapman	100
Raton, Sugarite Lake	200
Wagonmound, Santa Clara River	200
New York:	
Antwerp, Indian River	100
Berlin, Kendall Lake	150
Caldwell, trout lake	150
Central Valley, Summit Lake	200
Twin Lake	200
Dover Plains, Lake Allis	200
Friendship, waterworks reservoir	300
Highland Mills, Cromwell Lake	200
Medina, Oak Orchard Creek	600
Monticello, Kiamesha Lake	150
Munroe, Mombasha Lake	200
Round Lake	200
Walton Lake	200
Montrose, West Dam	200
Port Jervis, Mashipacong Lake	160
Sterling Forest, Greenwood Lake	200
Stockport, Smith Lake	150
Utica, waterworks reservoir	100
Water Mill, Nowcedonah Lake	200
Large-mouth black bass—Continued.	
North Carolina:	
Aberdeen, Upchurch Pond	100
Airlie, Thorn Mill Pond	100
Allenton, Spring Branch	75
Apex, Norris Pond	50
Boonford, South Toe River	200
Browns Summit, Maple Pond	75
Buckhorn, Heckist Creek Pond	75
Carthage, Haggordsville Mill Pond	200
Charlotte, Country Club Lake	100
Clyde, Smather Lake	75
Eure, Taylors mill pond	200
Fayetteville, Beaver Lake	100
Beaver Dam Pond	100
Greens Pond	100
Lakewood Pond	100
Flatrock, Smyth Lake	1,000
Fremont, pond	75
Fuquay Springs, Powells Pond	150
Galax, Toe River	1,000
Goldsboro, Country Club Lake	150
ponds (2)	175
Tara Farm Pond	50
Graham, Alamance Creek	100
Greenlee, Catawba River	1,400
Havelock, Morton Mill Pond	75
Hendersonville, park pond	100
Hickory, Ellis Pond	150
Laurel Hill, McMillan Pond	75
Laurinburg, Fairley Pond	75
Lee Mill Pond	75
McNiell Pond	75
Lenoir, Bass Lake	150
Yadkin River Dam	1,125
Maiden, Williams Pond	975
Marion, Bush Creek below falls	1,000
Catawba River	1,400
North Fork Catawba River	1,400
Matthews, Paddle Branch Pond	2,850
Munroe, Houston Pond	50
Morganton, McDowells Pond	150
Morrisville, Ferrell Pond	50
Mount Airy, Ararat River	100
Buck Shoals Pond	175
Mount Gilead, Clarks Creek	100
Mount Olive, Goodson Pond	100
Polkton, pond	75
Reidsville, Lake Manana	150
Rowland, McCallum Pond	175
Salisbury, Fishers Mill Pond	100
Springhope, pond	75
Stokesdale, pond	87
Ogburns Pond	88
Wilbon, Marsh Branch	100
Wilmington, lake	75
North Dakota:	
Bottineau, Lake	200
Rose Lake	300
Willow Lake	300
Denhoff, Brush Lake	200
Ellendale, Johnson Pond	200
Glenellen, Curlew Creek	200
Richardton, lakes (2)	300
Rolla, Indian Lake	200
Magock Lake	300
Rabbitt City Lake	200
Zeeland, Richter Pond	150
Ohio:	
Bellaire, storage dam	150
Alliance, pond	375
Lake Park Lake	400
Brooklyn, Spring Pond	150
Chardon, Cass Lake	575
Chillicothe, Elensmere Lake	625
Chippewa Lake, Chippewa Lake	493

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Ohio—Continued.	
Cincinnati, Delhi Pike Pond	75
Cuyahoga Falls, Cuyahoga River	300
Dayton, Soldiers Home Lake	6,375
Stillwater River	500
Delaware, Scioto River	400
Earlville, Twin Lakes	450
Epworth Heights, Little Miami River	300
Freedom Station, Crystal Spring Lake	100
Geauga Lake, Geauga Lake	600
Hudson, Mud Brook Pond	300
Macedonia, Shadow Lake	150
Mantua, Cuyahoga River	400
Milford, Little Miami River	300
New Carlisle, Silver Lake	200
Oakhill, Lime Stone Pond	75
Pleasanthill, Stillwater River	200
Portsmouth, Fish Lake	200
Toledo, Buckeye Pond	150
Uniopolis, Copeland Lake	95
West Milton, Stillwater River	500
West Salem, McFadden Pond	90
Wilmington, gravel pit pond	100
Oklahoma:	
Aline, pond	225
Altus, pond	75
Apache, pond	150
Aurora, Jones Pond	100
Blackwell, pond	75
Cement, McCartio Creek	150
Chattanooga, Chattanooga Lake	100
Comanche County, Branch of Little Beaver Creek	100
Ketcham Lake	100
McManomy Pond	100
mill pond	150
Wood Lake	75
Cushing, Cushing Pond	100
Davenport, Octone Pond	200
Dover, pond	100
Drummond, pond	75
Edmond, Chisholm Creek	150
Elgin, Big Four Pond	75
Spring Pond	50
Elreno, Peach Lake	150
pond	100
Enid, pond	150
Erick, Terrell Lake	150
Fallis, Hamel Lake	150
Fletcher, Meadow Brook Pond	50
Fort Cobb, Spring Creek	100
Frederick, Prairie Spring Pond	150
Grant County, Spring Creek	200
Guthrie, Ellison Lake	300
Lower Lake	150
Pleasant Lake	150
pond	75
Guymon, Frisco Creek	575
Hobart, pond	275
Kingfisher, pond	50
Lawton, pond	100
Lexington, Farmers Lake	150
Maramec, Maramec Lake	250
Marshall, pond	100
Okarche, pond	50
Olustee, pond	150
Perry, pond	150
Quay, pond	100
Stillwater, pond	75
Gun Clubs Pond	225

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Oklahoma—Continued.	
Weatherford, pond	100
Woodward, Spring Lakes	225
Pennsylvania:	
Arcola, Perkiomen River	300
Bethlehem, Lake Poponoming	500
Lehigh River	300
Brackney, Quaker Lake	100
Brillhart, South Branch of Codorus Creek	250
Bushkill, Delaware River	300
Forest Lake	200
Chambersburg, Conococheague Creek	150
Colledgeville, Perkiomen Creek	500
Coolbaugh, Lake Echo	200
Curtin, Bald Eagle Creek	50
Delaware Water Gap, Delaware River	400
Frackville, Mud Run Dam	150
Gaines Junction, Pine Creek	300
Hanover, Conewago Creek	250
Harrisburg, Conodoquinet Creek	150
Hollidaysburg, Juniata River	350
Hopewell, Raystown Branch of Juniata River	100
Lehigh Gap, Aquashicola Creek	300
Lehighton, Harmony Lake	300
Lizard Creek	200
Mahoning Creek	300
Stedman Pond	200
Milton, Susquehanna River	300
Naomipines, Lake Naomi	200
New Freedom, ponds (2)	450
Nordmont, Lopey Pond	300
Norristown, Oaklawn Lake	100
Phoenixville, French Creek	300
Pickering Creek	300
Pigeon Creek	300
Royal Spring Creek	200
Stony Run	200
Port Indian, Norristown Dam in the Schuylkill River	1,500
Riverside, North Branch of Susquehanna River	150
Rising Springs, Sinking Creek	300
Rose Lake, Rose Lake	150
Rowland, Big Tink Lake	200
Teedyskung Lake	100
Scotland, Conococheague Creek	100
Scranton, gravel pond	100
Shenandoah, Raven Run Dam	150
Starrucca, Coxtown Lake	100
Stroudsburg, Delaware River	200
Hunters Range Pond	200
McMichaels Creek	400
Susquehanna, Susquehanna River	150
Tower City, Wiconisco Creek	150
Waynesboro, Lake Royer	200
Weissport, Big Creek	300
Wheelerville, Elk Lake	200
Winwood, Sister Lake	100
Yardley, Afton Lake	150
York, Little Conewago Creek	250
Rhode Island:	
Rhode Island Fish Commission, Providence	500
Rhode Island Fish Commission, Westerly	300
South Carolina:	
Aiken, mill pond	1,200
Town Creek	1,200
Barnwell, Hagood mill pond	1,000
Turkey Creek	1,000
Batesburg, Hartley Pond	1,000

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
South Carolina—Continued.	
Denmark, Savannah Pond	1,200
Eastover, pond	250
Enoree, Beaver Dam Creek	1,000
Buck Head Creek	1,000
Cedar Shoal Creek	1,000
Elisha Creek	1,000
Enoree River	1,000
Fork Shoal Creek	1,000
Poyes Creek	1,000
Two Mile Creek	1,000
Warrior Creek	1,000
Fountain Inn, Big Creek	1,000
Reedy River	3,000
Gray Court, Reedy River	3,000
Greenville, Buck Horn Creek	2,000
Middle Tyger Creek	1,000
Mount Creek	1,000
Reedy River Mill Pond	1,000
Richland Creek	1,000
South Enoree Creek	1,000
South Saluda River	2,000
Woods Pond	1,000
Jefferson, Big Fork Creek	1,325
Black Creek	825
Lynchs River	1,325
Rocky Creek	825
Johnston, Satcher Pond	800
Kershaw, Freeman Pond	1,300
Lanford, Beaver Dam Creek	1,000
Leesville, Quattlebam Mill Pond	1,000
Livingston, Bohn Pond	200
Little Beaver Pond	500
Lynchburg, Lynchs River	133
Macedon, pond	500
Mullins, Little Pee Dee River	550
Neeses, Bolin Pond	500
Johnson Pond	500
Otranto, Goose Creek	2,700
Owings, Saxons Pond	800
Rock Hill, Catawba Power Company pond	5,250
Spartanburg, Drayton Mills lower pond	500
Drayton Pond	800
Floyd Pond	800
High Pond	800
Lawsons Fork Creek	2,000
Nesbit Pond	800
Roquie Pond	800
Whites mill pond	1,500
Sumter, Friar Pond	500
Swansea, Third Branch Pond	300
Trenton, Hatchie Pond	800
Troy, Davis Pond	800
Kennedy Pond	800
Solomons Pond	800
Verdery, Reedy Branch	250
Wellford, Berry Shoal Pond	2,500
Westville, pond	800
Williston, Addison mill pond	400
South Dakota:	
Alpena, Brayton Ranch Lake	150
Delasca Lake	200
Lake Alpena	150
Schmidts Lake	200
Serfkins Lake	100
Artesian, Fish Lake	150
Bellefourche, Redwater River	300
Canton, Sioux River	300
Carthage, Redstone Creek	200
Clear Lake, Clear Lake	700
Fairfax, Frasch Pond	350
Forestburg, lake	300
Sunset Lake	200
Kimball, McKee Lake	150
Miller Lake	150

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
South Dakota—Continued.	
Loyalton, pond	100
Menno, James River	300
Mitchell, James River	500
Oelrichs, Alkire Pond	100
Pierre, pond	400
Medicine Creek	500
Plankinton, pond	150
Redfield, Crystal Lake	200
Rosebud, Cut Meat Creek	500
Eagle Creek	200
Upper Cut Meat Creek	200
White Horse Pond	200
Tyndall, lake	150
Vermilion, Vermilion River	300
Waubay, Blue Dog Lake	300
White Lake, Severance Pond	150
Woonsocket, lake	200
pond	200
Yankton, artificial lake	100
Dakota River	300
James River	300
Tennessee:	
Bean Station, Thorn Hill Pond	53
Cedar Hill, Sulphur Fork of Red River	300
Chattanooga, Chickamauga Creek	2,000
Chickamauga Lake	1,000
East Lake	50
Lookout Creek	1,650
Read Lake	1,000
Clarksville, Red River	200
Cleveland, Edgewood Lake	300
Columbia, Duck River	310
Delrio, Big Creek	100
Laurel Creek	100
Dunn, Peach Rolls mill pond	66
Estill Springs, Elk River	150
Franklin, Big Harpeth River	750
Lick Creek	1,500
West Harpeth River	600
Gallatin, Lane Pond	50
Helenwood, New River	53
Hornsprings, Horn Springs	53
Johnson City, Knob Creek	150
Sinking Creek	1,400
Knoxville, Tennessee River	225
Lawrenceburg, Beelers Fork	185
Crowson Creek	66
Knob Creek	185
Shoal Creek	185
Leadvale, French Broad River	100
Mason, Hamblett Lake	100
Medon, Piny Pond	75
Montgomery County, pond	75
Murfreesboro, Stones River	825
Nashville, Watauga Lake	50
Welsh Pond	180
Newport, Big Pigeon River	450
Raines Pond	50
Noeton, German Creek	53
Holston River	1,975
Normandy, Waite Lake	1,000
Ozone, Fern Lake	53
Persia, Dodsons Creek	53
Pulaski, Weakley Creek	1,000
Selmer, Expansion Lake	150
Smyrna, Stuarts Creek	50
Springfield, Sulphur Fork of Red River	1,125
Summerton, Little Buffalo Creek	185
Tellico Junction, McDaniel Lake	50
Tracy City, East Fork Pond	70
Wilton, Cosby Creek	150
Shavers Creek	75

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Texas:	
Adkins, pond	40
Alba, pond	100
Alpine, lake	200
Alto, Hills Pond	200
Alvarado, pond	100
Amarillo, East Amarillo Creek	1,300
Arlington, Jones Pond	120
Arp, Hughes Pond	200
Atlanta, Big Lake	525
Atlast, Thompson Lake	825
Austin, Spring Lake	150
Avery, Douglas gin pond	120
ponds (2)	350
Axtell, pond	300
Bassette, Corley Pond	20
May Pond	100
Bay City, Brady Lake	500
Hudgins Lake	400
Beaumont, Mirror Lake	100
Bellbranch, railroad lake	2,027
Bellevue, railroad lake	500
Belton, Leon River	500
Bettie, Anderson Pond	300
Big Springs, Mesquite Pond	200
Bonham, Club Lake	150
lakes (2)	800
pond	400
Rogers Lake	120
Booth, Smithers Lake	300
Bovina, pond	50
Brady, pond	100
Bransford, railroad lake	150
Brownsville, Lake Ebano	300
Lakeview Pond	300
Lower Guerra Resaca Pond	250
Resaca de la Palma Pond	300
Upper Guerra Resaca Pond	250
Brownwood, Anderson Pond	150
Holgate Pond	120
Johnson Lake	200
lake	200
ponds (4)	800
West Lake	300
Bryan, Fin and Feather Club Lake	300
pond	300
railroad lake	13
Bryson, Hunt Pond	200
Salt Creek	1,000
Calvert, Little Brazos River	500
ponds (2)	350
Valley View Pond	150
Cameron, Angell Pond	200
Jenks Pond	200
pond	200
Rogers Pond	150
Canyon City, Terra Blanco River	950
Carmona, pond	150
Caro, upper pool	400
Channing, McDowells Pond	150
Childress, railroad lake	500
Chilton, Cow Bayou	1,000
Cisco, lake	400
Lake Bernie	400
Clarksville, pond	120
Jamison Pond	500
Cleburne, Johnsons Ranch Lake	40
Clevenger, pond	300
Coleman, Henderson Pond	100
Coleman Junction, Junction Lake	500
Colorado, pond	75
Coolidge, reservoir	1,400
waterworks lake	300
Large-mouth black bass—Continued.	
Texas—Continued.	
Corpus Christi, Fortuna Pond	300
Corsicana, Cunningham Pond	50
Johnson Pond	200
lake No. 3	120
Morse Pond	50
ponds (5)	900
Walton Pond	50
Covington, reservoir	300
Craft, Dover Pond	200
Crockett, Patrick Lake	500
South End Lake	150
Crush, Crush Pool	400
Cuero, pond	150
D'Hanis, Seco River	1,000
Dallas, Exall Lake	300
Lindale Lake	500
Trinity River	320
Denison, Carlat Pond	120
Detroit, Caton Pool	100
Clubs Lake	300
oil company's lake	300
Duncan Lake	200
light plant pond	200
Whitley Lake	200
Dodd City, Hunters gin pond	100
oil mill lake	150
Dodge, Sheppard Lake	300
Electra, Cottonwood Pond	150
Hereford Lake	500
Elgin, Christian Lake	200
Fisher Lake	100
lakes (2)	250
Pinsons Lake	200
ponds (3)	425
Sandifers Lake	125
Sharp Pond	100
Elkhart, Elkhart Lake	1,200
El Paso, smelting works pond	120
Vinton Lake	120
Emory, Holmes Pond	200
Ennis, Moore Pond	300
Eskota, Wilson Fork of Brazos River	500
Falls City, lake	300
Ferris, Stainback Lake	200
Forney, pond	120
Fort Worth, pond	200
lake	300
Sycamore Lake	250
Franklin, Running Pond	200
Graham, Clark Pond	150
Dry Creek Pond	150
Elm Creek	1,000
lake	200
Phillips Lake	500
Salt Creek	500
Spring Lake	300
Turtle Hole Lake	500
ponds (23)	3,810
Greatland, Tyer Pond	400
Greenville, Fords Lake	100
reservoir	20
Hallville, Cain Pond	100
Henderson, Graham Lake	300
Hereford, pond	150
Middle Tule Pond	150
Terra Blanco River	1,000
Hillsboro, Lake Park Lake	1,000
Honeygrove, Provine Lake	200
Houston, Highland Park Lake	300
Hubbard, Davis Pond	50
gravel pit	250
Hubbard Reservoir	1,200
Jim Jones Pond	150
Mills Brothers Pond	100
pond	150
Powell Pond	400
Prairie Lake	250

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Texas—Continued.	
Hubbard, Priddy Lake	120
Smith Pond	100
Wood Pond	200
Woollett Lake	150
Yonkapin Lake	400
Huntsville, Hess Lake	150
Iatan, pond	120
Iatan Lake	400
Irene, Railroad Lake	12
Italy, Belle Branch Lake	100
Jacksboro, ponds (2)	320
Jacksonville, Black Lake	500
Jeffries, Eeds Pond	150
Wilson Pond	150
Josserand, Big Pond	300
Kaufman, Bruton Pond	120
Eagan Lake	300
Electric Light Pond	150
Jenkins Pond	250
Murdock Lake	120
Park Lake	400
ponds (5)	600
Taylor Pond	350
Keltys, pond	300
Kingsville, lake	150
Reads Pond	200
reservoir	150
Klondyke, pond	150
Kyle, Ferg Kyle Pond	200
Laredo, San Ygnacio Pond	620
Larue, pond	200
Lockhart, Montgomery Pond	150
Lometa, pond	100
Lovelady, Long Pond	150
Lufkin, Lake Elmira	400
McDade, pond	50
McDade Pond	150
McKinney, Rhea Pond	150
Mabank artificial lake	150
mill pond	200
Mitchells Pond	100
ponds (2)	300
Madisonville, Patterson Lake	100
Manchaca, Davis Lake	120
Marquez, Carrington Lake	200
Mart, railroad lake	163
Millsap, Bennett Pond	400
Mineral Wells, Pinto Lake	500
Mount Pleasant, pond	75
waterworks reservoir	100
Nacogdoches, Willow Lake	200
Naples, Baker Pond	40
Navasota, railroad lake	12
New Boston, Club Lake	150
New Waverly, Martin Pond	150
Osceola, Osceola Reservoir	300
Otto, Big Lake	300
Martin Pond	200
Overton, Woods Lake	200
Palestine, lake	75
pond	75
Reuter Lake	500
waterworks lake	500
Palmer, Payne Pond	150
Reddell Pond	150
Panhandle, Antelope Creek	500
Moores Creek	500
Paris, Connor Pond	200
Crook Pond	200
lakes (2)	500
pond	150
Penelope, Penelope Lake	200
railroad lake	2,028
Pettus, pond	40
Pittsburg, Davis Pond	400
Pollok, Bodan Lake	50
Quannah, Beaver Creek Pond	500
Large-mouth black bass—Continued.	
Texas—Continued.	
Riverside, Thomas Lake	150
Rockdale, Hicks Pond	200
pond	125
Rusk, McCord Pond	200
Mud Creek	500
reservoir	300
Spring Pond	300
Sabinal, Dinner Creek	500
San Angelo, Dove Creek	1,500
Kickapoo Creek	1,000
Spring Creek	1,000
San Antonio, Madarazy Pond	200
Mitchell Lake	500
pond	100
San Antonio River	50
Vernor Lake	100
Sanger, Duck Creek	1,000
Santo, pond	300
Saron, pond	300
Seguin, Guadaloupe River	1,300
Seymour, Nail Pond	100
ponds (4)	200
Sherman, Windy Lake	150
Shiner, Martin Pond	150
Stone, Brenham Gun Club Lake	500
Strawn, McCollister Lake	300
Sulphur Springs, Coleman Lake	200
Hurley Pond	150
Katy Pool	400
McKay Pond	150
Seale Pond	100
Witherspoon Pond	150
Swan, Spring Pond	200
Sweetwater, Bridges Pond	120
ponds (2)	520
Tascosa, Tascosa Creek	800
Taylor, Flag Springs	350
Turkey Creek	1,000
Tehuacana, Tehuacana Lake	600
Terrell, Andrews Pond	150
Barton Lake	100
Barton Pond	100
Bass Lake	300
Cate Ranch Pond	200
Country Club Lake	500
McCartney Pond	120
O'Connor Pond	250
Story Pond	100
Wisdom Pond	200
Wood Pond	300
Texarkana, ponds (2)	500
Thorndale, Caffey Pond	200
Thornton, Bradley Pond	120
Tioga, Rogers Lake	200
Trinity, Maury Lake	150
Tyler, Ben Smith Lake	200
Evergreen Lake	300
Flag Lake	500
Greenbrier Country Club Lake	1,000
North Lake	300
Ray Creek	1,000
Spicer Lake	300
Willow Park Lake	300
Uvalde, Leona River	1,000
Venus, pond	150
Waco, Beville Lake	500
Crippen Lake	200
Days Lake	700
Horn Lake	200
lakes (2)	800
Palmetto Lake	300
pond	300
Waller, McKinney Island Creek	300
Walling, White Pond	100
Waxahachie, Sims Pond	150
Weatherford, Clear Lake	400

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Large-mouth black bass—Continued.	
Texas—Continued.	
Weatherford, pond	150
Silver Lake	200
Whitesboro, Anderson Pond	200
Wichita Falls, Souter Lake	300
Willspoint, lake	150
Winnsboro, Green Pond	500
Steed Pond	200
Winnsboro Pool	400
Wolfe City, pond	100
Restover Pond	250
Utah:	
Mount Pleasant, Spring Pond	100
Virginia:	
Arrington, Big Piney River	500
Ashburn, Goose Creek	100
Ashland, King Pond	500
Atlee, Diamond Hill Pond	200
Beaver Dam, Little River Mill Pond	500
Boyce, Shenandoah River	200
Bristow, Broad Run	200
Catletts, Cedar Run	800
Cedar Creek, Jackson River	7,800
Charles City County, Shirley Pond	500
Cohoke, Cohoke Pond	450
Covington, Jackson River	200
Potts Creek	150
Edinburg, Stony Creek	750
Emporia, Meherrin River	200
Fries, New River	150
Gordonsville, Grassdale Pond	300
Mountain View Pond	200
Hanover, Spring Pond	300
Honaker, Lewis Creek	100
Tunnel Pond	50
Hot Springs, Jackson River	200
Laurel, Bolton Pond	300
pond	200
Willow Branch Pond	500
Lorraine, Tuckahoe Creek	600
Maidens, Upper Beaver Dam Creek	700
Manchester, Licking Creek Club Pond	400
Midlothian, Midlothian Pond	200
Mineral, North Anna River	400
Morrison, Causey Mill Pond	400
Mount Jackson, North Branch Shenandoah River	1,000
Occoquan, Occoquan River	1,000
Orkney Springs, Orkney Lake	150
Pendleton, South Anna River	500
Rapidan, Breese Lake	250
Rapidan River	800
Remington, Rappahannock River	700
Richmond, Clarendon Pond	200
mill pond	200
Minge Pond	400
Schwams Pond	500
West Hampton Lake	300
Wooldridge Pond	400
Yahleys Pond	200
Riverton, North Branch Shenandoah River	450
South Branch Shenandoah River	450
Rockfish, Rockfish River	500
Round Hill, pond	100
Strasburg, Shenandoah River	200
North Fork Shenandoah River	200
Tumbling Run	200
Toano, Whitakers Mill Pond	300
Large-mouth black bass—Continued.	
Virginia—Continued.	
Warrenton, ice pond	100
Widewater, Aquia Creek	800
Bellfair Mill Pond	400
Wilcox Wharf, Buckland Pond	1,500
Indian Field Pond	1,000
Williamsburg, Kings Mill Pond	300
pond	500
Wytheville, Reed Creek	50,052
Zuni, pond	100
Washington:	
Buckley, Lake Tapps	500
Lakeview, American and Gravelly lakes	6,275
Seattle, Gazzon Lake	300
Tradistion Lake	300
Tacoma, Carp Lake	300
Spanaway Lake	300
Wapato Lake	300
Whatcom, Lake Wildwood	200
West Virginia:	
Alderson, Greenbrier River	300
Chester, Rock Springs Park Lake	150
Fairmount, Monongahela River	650
Grafton, Tygarts Valley River	450
Great Cacapon, Great Cacapon River	600
Huntington, Guyandotte River	200
Inwood, Back Creek	350
Morgantown, Monongahela River	1,550
Parkersburg, Shattuck Pond	150
Valley Falls, Tygarts Valley River	600
Wheeling, Big Wheeling Creek	400
Wisconsin:	
Augusta, Augusta Pond	200
Beef River	300
Bridge Creek	200
Coon Fork River	300
Dell Pond	300
Eau Claire River	600
Beloit, Rock River	200
Burlington, Browns Lake	300
Cassville, Mississippi River	1,000
Elcho, Enterprise Lake	200
Gagen, Twin Lakes	200
Glenbeulah, Crystal Lake	300
Glenhaven, Mississippi River	1,000
Hillsboro, Baraboo Creek Pond	200
Iron River, lake	200
Lake Nebagamon, Lake Nebagamon	200
Lynxville, Mississippi River	1,000
Necedah, Big Yellow Creek Pond	200
Rhinelander, Indian Lake	300
Lake George	300
North Pelican Lake	200
Woodruff, trout lake	200
Wyoming:	
Alladin, Bush Reservoir	300
Cody, Blirstin Lake	300
Parkman, Cooper Lake	350
reservoir	175
Sheridan, Dutch Creek Pond	1,725
Total [a]	713,111
Sunfish or bream.	
Alabama:	
Atmore, Mobly Mill Pond	400
Attalla, Big Spring	200
ponds (2)	400

[a] There were lost in transit 20,586 large-mouth black bass.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Sunfish or bream—Continued.	
Alabama—Continued.	
Birmingham, ponds (2)	400
Calera, Calera Lake	400
Choccolocco, pond	150
Clanton, pond	200
Columbia, Pettus Pond	150
Demopolis, Knox Lake	200
ponds (2)	670
Elba, Thomas Lake	200
Epes, Gibbs Pond	238
Eufaula, Bells Pond	150
Foy Pond	150
ponds (3)	600
Glenallen, pond	200
Inverness, Hough Pond	300
Jacksonville, Linder Pond	75
Jasper, reservoir	200
Keener, pond	200
Lincoln, Franklin Pond	75
Montgomery, Tyson Pond	100
Mountain Creek, Falkner Pond	300
Ohatchee, Ingram Lake	300
Opelika, pond	75
Owassa, Shell Pond	300
Ozark, pond	200
Pell City, Spring Pond	200
River Falls, Gantt Pond	100
Russellville, branch of Cedar Creek	200
Morrow Pond	500
Seale, Dudleys Lake	100
pond	100
Selma, Oil Mill Pond	200
Spring Branch Pond	100
Talladega, Talladega Creek	800
Tennille, Clear Water Creek Pond	400
Troy, Ross Pond No. 2	200
Union Springs, Randle Pond	100
Walker Pond	100
Georgia:	
Albany, Flint River	100
Americus, Hooks Mill Pond	1,100
Athens, Oconee River	300
pond	150
waterworks pond	175
Atlanta, Valley Hill Pond	250
Augusta, Augusta Game Preserve Pond	400
Box Springs, Lake Mohignac	500
Brownwood, Kinchafoonee River	400
Cairo, Big Tired Pond	200
ponds (2)	400
Clito, pond	250
Cochran, pond	300
Spring Lake	200
Columbus, Garrard Pond	100
Mossey Place Pond	150
ponds (2)	350
Cornelia, Hazel Creek	150
Cusseta, pond	200
Cuthbert, Crystal Lake	400
Ellijay, Smith Pond	200
Fitzgerald, Dorminey Mill Pond	500
Griffin, Grantland Pond	400
Hogansville, pond	300
Jefferson, Silmon Pond	150
Jonesboro, Pine Lake	300
Waldrop Pond	350
Whaley Lake	350
Juniper, Chandler Pond	500
Lavonia, pond	200
Leary, Cordray Mill Pond	500
Lithonia, pond	150
Macon, Bibb Mill Pond	250
Swift Creek	500
Marshallville, Rock Spring Pond	400
Montezuma, Mill Pond	400
Sunfish or bream—Continued.	
Georgia—Continued.	
Sandersville, Knight Pond	300
Thomson, pond	150
Winder, Smith Pond	150
Zebulon, Cadenhead Pond	200
Illinois:	
Blanding, Mississippi River	20,000
Chicago, South Park Lake	275
East Dubuque, Mississippi River	20,000
Galena, Mississippi River	50,000
Savanna, Mississippi River	45,000
Indian Territory:	
Ardmore, Chickasaw Club Lake	200
Choctaw Lake	100
Iowa:	
Bellevue, Mississippi River	15,000
Charles City, Cedar River	500
Clayton, Mississippi River	30,000
Dubuque, Mississippi River	25,000
Gordons Ferry, Mississippi River	68,000
Green Island, Mississippi River	5,000
Iowa Falls, Iowa River	100
Lainsville, Mississippi River	10,000
North McGregor, Mississippi River	30,000
Smith Ferry, Mississippi River	18,000
Wadena, Volga River	300
Winthrop, Wapsipinicon River	50
Kentucky:	
Butler, lake	150
Crab Orchard, Spring Lake	100
Elkhorn, Belle Brook Pond	100
Eminence, Sanford Pond	100
Frankfort, Kentucky River Pond	350
Trimble Pond	200
Mount Sterling, Chenonet Pond	150
Louisiana:	
Natchitoches, Chaplin Lake	200
Mississippi:	
Belden, pond	300
Booneville, pond	125
Brooksville, Cunningham Mill pond	150
Haynes Mill Pond	450
Madison Pond	300
Moon Pond	300
Plantation Pond	300
pond	450
Canton, Coleman Pond	200
Carrollton, pond	225
Corinth, Bell Pond	150
Chambers Creek	2,000
Clear Creek	650
Coon Creek Pond	1,000
Derryberry Pond	200
Elams Creek	1,200
Long Pond	200
Powells Lake	500
Reynolds Mill Pond	300
Tuscumbia River	2,000
Vanderford Mill Pond	500
Voyle Pond	150
Wallace Pond	500
Waukomis Lake	300
Wilson Pond	150
Deer Brook, pond	450
Guntown, pond	125
Harriston, Cato Mill Pond	100
Lockhart, pond	400
Macon, Cavett Pond	800
Mill Pond	300
Martin, Barland Pond	150
Meridian, Wagner Pond	600
Myrtle, Springdale Pond	450
Plantersville, Stovall Pool	400

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Fingerlings, yearlings, and adults.
Sunfish or bream—Continued.	
Mississippi—Continued.	
Pleasant Hill, Bridgforth Pond	450
Shuqualak, pond	225
Tupelo, Filgo Pond	400
Verona, Walkers Pond	300
Missouri:	
St. Louis, Louisiana Purchase Exposition	30
North Carolina:	
Haw River, pond	300
Hendersonville, Ewart Pond	400
Lower Hungary Creek	400
pond	600
Rhetts Pond	600
Monroe, Houston Pond	300
Raleigh, McCuller Pond	300
pond	100
Richardson Pond	300
Wyatts mill pond	350
South Carolina:	
Barnwell, Hair Pond	75
Batesburg, Hossepen Creek	100
Charleston, Goose Creek	800
Columbia, lake	200
Cowpens, Martin Pond	100
Darlington, Charles mill pond	100
Enoree, Enoree River	100
ponds (2)	200
Yarbrough Pond	100
Greenville, pond	50
Lancaster, pond	150
Landrum, Belue Pond	50
Belue mill pond	50
Collis Creek	400
Page Pond	300
Smith Creek	500
Leesville, Quattlebaum mill pond	100
McBee, Little Fork Creek	150
Lowery Pond	150
Welsh Pond	150
Rockhill, Catawba Creek	100
Spartanburg, city reservoir	300
Drayton Pond	200
Upper Drayton Pond	50
Trenton, pond	100

Species and disposition.	Fingerlings, yearlings, and adults.
Sunfish or bream—Continued.	
South Carolina—Continued.	
Troy, Talbert Pond	100
Williston, Smith Pond	200
Tennessee:	
Nashville, Cumberland River	800
Texas:	
Amarillo, Bonita Creek	200
Bellbranch, Railroad Lake	400
Bransford, Railroad Lake	100
Brownsville, Lakeview Pond	300
Bryan, Railroad Lake	450
Clarendon, Buntin Pond	75
Corpus Christi, pond	150
El Paso, old river-bed	200
Smelter Pond	150
Franklin, pond	100
Fort Worth, Field Pond	150
Greenville, Foster Lake	200
Graveyard Pool	75
Nichol Pond	70
reservoir	100
Henderson, pond	125
Irene, Railroad Lake	400
Italy, Belle Branch Lake	200
Manor, Prinz Pond	50
Mart, Railroad Lake	400
Mount Pleasant, pond	75
Tennison Pond	50
Navasota, Railroad Lake	450
Overton, Norvell Pond	100
Penelope, Railroad Lake	400
Plano, Huffman Pond	50
San Antonio, Mitchell Lake	1,500
San Antonio River	1,100
West End Lake	1,000
Stone, Lake Watson	200
Sulphur Springs, Lake Keasler	100
Terrell, Brin Pond	50
West Virginia:	
Hinton, New River	400
Wisconsin:	
Cassville, Mississippi River	20,000
Glenhaven, Mississippi River	15,000
Lynxville, Mississippi River	15,000
Total [a]	447,908

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Pike perch.			
Connecticut:			
Bethel, Taunton Lake		500,000	
Indiana:			
Albion, Sand Lake		300,000	
Bremen, Lake of the Woods		500,000	
Columbia City, lake		300,000	
Middlebury, Hunter Lake		700,000	
Iowa:			
Calmar, Big Turkey River			25
Fairfield, Water Works Reservoir			70
Iowa Falls, Iowa River			100
Manchester, Maquoketa River			50
Winthrop, Wapsipinicon River			150
Maryland:			
Greenmount, Gunpowder River		350,000	
Massachusetts:			
Gloucester, Cope Pond		500,000	
Haverhill, Chadwicks Pond		500,000	
Massachusetts Fish Commission, Wilkinsonville	5,000,000		

[a] There were lost in transit 2,242 sunfish.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Pike perch—Continued.			
Michigan:			
Alpena, Thunder Bay		5,000,000	
Bay City, Saginaw Bay		3,000,000	
Belle Isle, Detroit River		8,000,000	
Beulah, Crystal Lake		1,000,000	
Michigan Fish Commission, Detroit	52,400,000		
Pentoga, Indian Lake		500,000	
Pontiac, Cass Lake		1,000,000	
Roberts Landing, St. Clair River		3,000,000	
Minnesota:			
Barnum, Bear Lake		500,000	
Fergus Falls, Indian Lake		300,000	
Long Lake		300,000	
Little Falls, Green Prairie Lake		500,000	
St. Peter, Lake Jefferson		800,000	
West Duluth, Lake Berg		200,000	
Missouri:			
Missouri Fish Commission, St. Joseph	10,000,000		
Nebraska:			
Nebraska Fish Commission, South Bend	15,000,000		
New Jersey:			
Williamstown, McClure Lake		249,900	
New York:			
Hemlock, Hemlock Lake		500,000	
Near Cape Vincent, St. Lawrence River		3,550,000	
New York, Battery Park Aquarium	2,000,000		
New York Fish Commission, Caledonia	5,000,000		
Ohio:			
Beckett, Muskingum River		900,000	
Catawba Island, Lake Erie		30,000,000	
Locust Point, Lake Erie		20,000,000	
Lowell, Muskingum River		900,000	
Marblehead, Lake Erie		20,000,000	
Marietta, Muskingum River		900,000	
Port Clinton, Lake Erie		23,200,000	
Put-in Bay, Lake Erie		56,000,000	
Pennsylvania:			
Beavertown, Middle Creek		250,000	
Clearfield, Susquehanna River		250,000	
Hopewell, Raystown Branch of Juniata River		250,000	
Milton, Susquehanna River		500,000	
West Branch of Susquehanna River		250,000	
Orson, Bone Lake		150,000	
Independent Lake		150,000	
Pennsylvania Fish Commission, Erie	63,350,000		
Saegerstown, French Creek		250,000	
Scranton, Cobbs Pond		150,000	
Watsontown, Susquehanna River		250,000	
Vermont:			
Cambridge Junction, Lamoille River		500,000	
Chester, Lowell Lake		500,000	
Fairlee, Lake Morey		300,000	
Hardwick, Lake Greenwood		500,000	
Ludlow, Electric Light Pond		500,000	
Montpelier, Curtis Pond		600,000	
Piedmont, Lake Morey		500,000	
Ricker Mills, Small Pond		500,000	
Swanton, Big Otter Creek		500,000	
Little Otter Creek		500,000	
McQuam Bay		1,000,000	
Missisquoi Bay		3,000,000	
Missisquoi River		48,498,875	
Winooski, Winooski River		1,000,000	
Virginia:			
Norfolk, Lake Smith		350,000	
Wisconsin:			
Baraboo, Devils Lake		500,000	
Greenwood, Black River		500,000	
Total [a]	152,750,000	246,148,775	395
Yellow perch.			
District of Columbia:			
Washington, Fish Lakes		300,000	
Illinois:			
Blanding, Mississippi River			10,000
East Dubuque, Mississippi River			10,000
Galena, Mississippi River			45,000
Savanna, Mississippi River			60,000

[a] There were lost in transit 100 pike perch fry.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Yellow perch—Continued.			
Indiana:			
Summitville, Hulls Lake			165
Iowa:			
Bellevue, Mississippi River			22,000
Calmar, Big Turkey River			150
Charles City, Cedar River			500
Clayton, Mississippi River			25,000
Dubuque, Mississippi River			4,000
Fairfield, waterworks reservoir			2,000
Gordons Ferry, Mississippi River			35,000
Green Island, Mississippi River			20,000
Iowa Falls, Iowa River			700
Lainsville, Mississippi River			15,000
Manchester, Maquoketa River		25,000	
North McGregor, Mississippi River			15,000
Smith Ferry, Mississippi River			20,000
Wadena, Volga River			2,000
Winthrop, Wapsipinicon River			1,200
Maryland:			
Battery Haul, Chesapeake Bay		26,107,649	
Bryans Point, Potomac River		650,000	
Cecil County, Elk River		1,060,020	
Mouth of North East River		1,500,000	
Harford County, Swan Creek		2,500,000	
Maryland Fish Commission, Baltimore	5,000,000		
off Accokeek Creek, Potomac River		9,975,000	
off Piscataway Creek, Potomac River		15,697,000	
Waterbury, fish pond		355,000	
Western Flats, Chesapeake Bay		57,689,480	
Massachusetts:			
Hubbardston, pond		500,000	
New York:			
Millerton, Indian Pond		300,000	
North Pond		225,000	
Rudd Pond		225,000	
Vermont:			
Groton, Groton Pond		4,334,372	
Virginia:			
Danville, Dan River		750,000	
Mount Vernon, Potomac River		4,777,000	
off Dogue Creek, Potomac River		8,225,000	
off Little Hunting Creek, Potomac River		4,257,000	
Wisconsin:			
Cassville, Mississippi River			12,000
Glenhaven, Mississippi River			15,000
Lynxville, Mississippi River			12,000
Total[a]	5,000,000	139,452,521	326,715
Striped bass.			
North Carolina:			
Elliott, Six Runs River		200,000	
Weldon, Roanoke River		2,263,000	
Total		2,463,000	
White perch.			
Maryland:			
Battery Haul, Chesapeake Bay		16,025,000	
Western Channel, Chesapeake Bay	700,000		
Western Flats, Chesapeake Bay		7,050,000	
Pennsylvania:			
Pennsylvania Fish Commission, Torresdale		225,000	
Rhode Island:			
Oakland Beach, Cresent Lake		200,000	
Vermont:			
Montpelier, Groton Pond		200,000	
Total	700,000	23,700,000	
Tautog.			
Massachusetts:			
Devils Foot Island, Vineyard Sound		1,587,000	
Lackeys Bay, Vineyard Sound		1,396,000	
Total		2,983,000	

[a] There were lost in transit 35 yellow perch yearlings.

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Cod.			
Maine:			
Boothbay Harbor, mouth of Linekin Bay		1,562,000	
Georgetown, ocean		813,000	
Sheepscot Bay		7,544,000	
Harpswell		980,000	
Monhegan		3,196,000	
Orrs Island, ocean		2,121,000	
Casco Bay		1,189,000	
Pemaquid, ocean		1,007,000	
Muscongus Sound		1,203,000	
Pemaquid Harbor		2,068,000	
Small Point, Casco Bay		940,000	
Southport, ocean		5,653,000	
Ebencook Harbor		390,000	
Sheepscot Bay		1,832,000	
Sheepscot River		6,890,000	
South Portland, ocean		9,414,000	
Massachusetts:			
Gloucester		55,210,000	
Gosnold, Vineyard Sound		264,000	
Gay Head, Vineyard Sound		1,978,000	
Jobs Neck, Vineyard Sound		1,320,000	
Nobska Light, Vineyard Sound		4,220,000	
Robinsons Hole, Vineyard Sound		9,637,000	
Rockport		13,368,000	
Tarpaulin Cove Light		32,062,000	
Weepecket Islands		3,349,000	
Woods Hole Harbor		1,064,000	
Total		169,577,000	
Pollock.			
Massachusetts:			
Gloucester		8,156,000	
Flatfish.			
Massachusetts:			
Gloucester		150,881,000	
Tarpaulin Cove		2,875,000	
Waquoit Bay		12,891,000	
Woods Hole Harbor		36,709,000	
Total		203,356,000	
Lobster.			
Connecticut:			
Fishers Island, Fishers Island Sound		998,000	
Morgans Point Light, Fishers Island Sound		2,134,000	
Maine:			
Bass Harbor		1,050,000	
Boothbay Harbor, Boothbay Harbor		7,168,000	
Linekin Bay		1,075,000	
Cape Porpoise		3,660,000	
Cranberry Island		1,050,000	
Cutler		2,800,000	
Deer Island		3,325,000	
Fletchers Neck, Gulf of Maine		3,000,000	
Friendship		700,000	
Georgetown, Sheepscot Bay		600,000	
Sheepscot River		1,200,000	
Horse Shoe Island, Small Point Bay		1,000,000	
Jonesport, Moose Peak Reach		875,000	
Kennebunk Beach		1,000,000	
Kennebunk Beach Cove		925,000	
Kennebunkport, ocean		1,000,000	
Kittery Point		3,550,000	
Lowells Cove, Gulf of Maine		2,500,000	
Orrs Island		1,375,000	
Small Point Bay		1,000,000	
Matinicus Harbor, Gulf of Maine		2,500,000	
off entrance		1,500,000	
Matinicus Island, off North End		750,000	
off South End		750,000	
Millbridge, Narraguagus River		1,710,000	
Monhegan Island		2,500,000	
Pemaquid		1,000,000	
Petit Manan Light		875,000	
Portland		3,000,000	
Prospect Harbor		2,900,000	
Rockland		500,000	
Skipper Joe Cove, Gulf of Maine		680,000	

DETAILS OF DISTRIBUTION—Continued.

Species and disposition.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Lobster—Continued.			
Maine—Continued.			
Small Point, Casco Bay		2,000,000	
Southport, Ebencook Harbor		1,000,000	
Southwest Harbor, Mount Desert		2,050,000	
Steuben, Dyers Bay		1,900,000	
Indian Harbor		1,140,000	
Stonington		1,200,000	
St. George, Georges Island Harbor		2,400,000	
Port Clyde Harbor		1,050,000	
Swan, Blue Hill Bay		1,200,000	
Tenants Harbor		1,125,000	
Turbine Cove		660,000	
Vinalhaven		1,900,000	
Westport, Sheepscot River		2,150,000	
Winter Harbor		2,275,000	
Wood Island Harbor		2,500,000	
York Harbor		1,250,000	
Massachusetts:			
Beverly		2,000,000	
Clarks Point Light, Buzzards Bay		1,072,000	
Cohasset Bay, north from		117,000	
Cuttyhunk, Buzzards Bay		700,000	
Eastern Light		500,000	
Egg Island		1,250,000	
Fawn Bar Buoy, Boston Bay		377,000	
Gloucester		4,500,000	
Graves Whistling Buoy, Boston Bay		378,000	
Great Ledge, Vineyard Sound		390,000	
Gull Island Buoy, Buzzards Bay		1,047,000	
Gurnett Light, Massachusetts Bay		78,000	
Hardings Ledge, Boston Bay		300,000	
Lackeys Bay, Vineyard Sound		153,000	
Manchester		1,200,000	
Marblehead		400,000	
Minots Ledge		156,000	
Nobska Light		542,000	
Penzance Point, Buzzards Bay		767,000	
Point Allerton, Boston Bay		125,000	
Quissett Harbor, Buzzards Bay		609,000	
Rockport		2,380,000	
Salem		100,000	
Salt Island		750,000	
Scituate		2,856,000	
Squam		1,400,000	
Tarpaulin Cove		905,000	
Thieves Ledge Buoy, Boston Bay		125,000	
Weepecket Islands		1,257,000	
Total		116,214,000	

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THE COMMERCIAL FISHERIES OF ALASKA IN 1905

By John N. Cobb

Assistant Agent at the Salmon Fisheries of Alaska

Bureau of Fisheries Document No. 603

CONTENTS.

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Assistant Agent at the Salmon Fisheries of Alaska.

INTRODUCTION.

The salmon and seal fisheries of Alaska constitute such conspicuous features of the fishing industry in that region that published reports have to a great extent neglected the other aquatic resources, and no complete compilation of statistics has ever been made. The Tenth (1880) and Eleventh (1890) censuses covered the ground partially, but the census agents had to deal with all phases of Alaskan endeavor and their reports upon the commercial fisheries were consequently not so complete as could be desired. The salmon fishery was treated by them in considerable detail, and has been canvassed and reported upon very fully by the Bureau of Fisheries.[a] The seal fishery has been the subject of investigation and legislation recorded in many volumes published by the Treasury Department, and more recently in the reports of the Department of Commerce and Labor. No special canvass of the other fisheries, however, has heretofore been made, the information published at varying periods by the Bureau of Fisheries being such as could be gathered by its agents at San Francisco in connection with their canvass of the Pacific coast states.

The data presented in the following pages for the year 1905 are the result of the writer's personal canvass of a portion of the region and the collection of reports from various fishing firms and officials of the government in Alaska. A history and recapitulation of results of the various fisheries is also given.

IMPORTANCE OF THE ALASKAN FISHERIES.

Long before the acquisition of Alaska was even dreamt of by our statesmen its wealth in fishery products was known, by hearsay at least, to the hardy mariners of the Pacific coast, as well as to the

[a] The salmon and salmon fisheries of Alaska. Report of the operations of the U. S. Fish Commission Steamer Albatross for the year ending June 30, 1898, by Jefferson F. Moser. Bulletin U. S. Fish Commission 1898, vol. XVIII, 1899, p. 1–178, pl. 1–63, charts A and B. Idem, 1900 and 1901, Bulletin 1901, vol. XXI, 1902, p. 173–398 and 299*–401*, pl. i–xliv, pl. A and charts A, B.

whalers from New Bedford, Mass., and other Atlantic ports, who frequented the waters of the north Pacific and Arctic oceans. In the memorial to the President of the United States adopted by the legislature of Washington Territory in the winter of 1866 especial stress was laid upon the fishery resources of the territory and the need for an arrangement with Russia by which our fishing vessels would be enabled to resort to the Alaskan harbors for shelter and to procure fuel, water, and provisions. Even at that time our fishermen were engaged in cod fishing on the Alaskan banks, the first vessel having gone there in 1863, while our whalers had been working in Bering Sea and along the Arctic shore for years.

The treaty of cession between Russia and the United States was signed March 30, 1867, ratified by the Senate May 28, and proclaimed by the President June 20 of the same year. Formal and actual possession was taken on the 16th of the following October. Much doubt was expressed in this country as to the wisdom of paying so large a sum of money for such an apparently sterile region as Alaska, and it was feared that the expenditure would never be justified. Such calculations were much at fault, however. The United States has not only been more than reimbursed directly, but through the fisheries alone has been many times compensated for the financial outlay. The rental from the fur-seal islands has more than paid the initial cost of the district, and at the present time the tax derived from the salmon fishery amounts to about $90,000 a year.

The following table shows, so far as it has been possible to secure reliable information, the quantity and value of fishery products secured in Alaskan waters from 1868 to 1905 (both inclusive). In some instances, where but rather fragmentary data could be obtained, estimates based upon the figures in hand have been inserted for the missing years. The second column in the table shows the products in units as put on the market, but in the third column all have been reduced to pounds for convenience in comparison. The dates given indicate the number of years the fishery in question has been prosecuted. No account has been taken in this table of the very extensive intertribal commerce of the natives in fishery products, as there are no accurate data for this feature.

QUANTITY AND VALUE OF THE FISHERY PRODUCTS OF ALASKA MARKETED IN STATED YEARS, 1868 TO 1905.

Species.	Quantity.	Prepared weight.	Value.
		Pounds.	
Codfish (1868–1905) .... pounds..	156,125,684	116,511,629	$4,072,626
Halibut (1890–1905) .... do....	37,999,506	29,630,373	921,562
Herring (1878–1905) .... do....	10,365,877	7,793,885	202,492
Guano .... do....	29,319,800	29,319,800	349,349
Oil .... gallons..	4,281,420	32,110,650	1,055,368
Salmon (1868–1905) .... pounds..	[a] 1,517,944,726	1,141,319,343	68,818,792
Sardines, canned (1904) .... cases..	3,173	152,304	12,059
Trout (1904–5) .... pounds..	55,382	44,306	2,307
Fish oil, other than herring (1890–1905) .... gallons..	30,486	228,645	8,657
Fish guano, other than herring (1904–5) .... pounds..	1,800	1,800	30
Clams, canned (1898–99, 1903–4) .... cases..	1,137	54,576	4,440
Walrus ivory (1868–1905) .... pounds..	843,930	843,930	343,542
Walrus oil (1868–1905) .... gallons..	3,064,001	22,980,007	1,582,219
Whalebone (1868–1905) [b] .... pounds..	246,166	246,166	567,417
Whale oil (1868–1905) [b] .... gallons..	26,518	198,885	15,911
Beaver (1868–1905) .... number..	150,683	150,683	752,011
Muskrat (1868–1905) .... do....	251,225	31,403	13,123
Otter:			
Land (1868–1905) .... do....	93,272	233,430	497,041
Sea (1868–1905) .... do....	107,121	535,605	10,732,867
Seals:			
Fur (1868–1905) .... do....	3,345,784	20,074,704	47,896,383
Hair (1868–1905) [b] .... do....	191,042	573,126	194,442
Total	....	1,403,035,250	138,042,638

[a] Includes 21,784,106 cases of canned salmon, with an estimated value of $3 per case.
[b] Estimated from data covering a portion of the period.

THE FISHING GROUNDS.

The district of Alaska is enormous in extent, being equal to nearly one-sixth of the United States proper. The total length of mainland from southeast to northwest is about 1,150 miles, the greatest width is about 800 miles, and the area is about 590,000 square miles. Because of the thousands of islands scattered along the coast, or, as in the case of the Aleutian chain, extending out to sea hundreds of miles, the district has an exceedingly long coast line and one well adapted to fishing, owing to the many large and safe bays, the sheltered channels between the islands and the mainland, and the numerous rivers which debouch from the mainland. The Nushagak River is to-day one of the important fishing streams of the world.

Following is a list of the fishing banks of importance off the Alaskan coast and in adjacent foreign waters so far as they have been discovered and charted. Notwithstanding the extensive fishing in this region, there are doubtless many fishing banks still unknown.

FISHING BANKS IN ALASKA AND ADJACENT FOREIGN WATERS.[a]

No. on chart	Name.	Locality.	Approximate position. Lat. N.	Approximate position. Long. W.	Approximate area.	Depth of water.	Kind of bottom.	Remarks (kind of fish, etc.).
			° ′	° ′	Sq. miles.	Fathoms.		
1		Okhotsk Sea	54 00	[b]148 00				Cod abundant; small halibut plentiful.
2		Bering Sea	58 00	165 00				Cod fairly abundant all over eastern part of sea as far out as 100-fathom line.
3	Slime Bank	do	55 00	164 00	1,445	20–50	Black sand and gravel.	Cod numerous; small halibut and red rockfish plentiful. Named from intermediate zone of jellyfish which cover fishing lines and bait with slime. Fishing good up to July 1. Slime too thick after that date.
4	Baird Bank	Bristol Bay	57 00	161 00	9,200	11–53	Gray sand, black sand, and gravel.	Cod numerous; small halibut and red rockfish plentiful. Best fishing ground about 20 miles off Port Moller.
5	Kulukak Ground	do	58 00	160 00		12–25	do	Cod fairly numerous; small halibut and red rockfish also to be found.
6	Davidson Bank	South of Unimak Island	54 00	164 00	1,600	41–72	Gray sand, gravel, and broken shells.	Cod numerous; small halibut and red rockfish plentiful; also mackerel around Unalaska Island.
7	Sannak Bank	Southeast of Sannak Island	54 00	162 00	1,300	30–82	do	Cod numerous; small halibut and red rockfish plentiful.
8	Shumagin Bank	Southeast of Shumagin Islands	55 00	159 00	1,800	25–79	do	Do.
9	Albatross Bank	Southeast of Kadiak Island	57 00	152 00	3,700	27–90	do	Do.
10	Portlock Bank	Northeast of Kadiak Island	58 00	150 00	6,800	37–67	do	Do.
11		Islands, coast of Alaska	56 00	134 00				Halibut found all through southeastern Alaska; also herring in great quantities.
12		Northwest of Queen Charlotte Islands.	54 00	133 00				Best halibut grounds; fish as a rule larger than those caught farther south.
13		Southwest of Queen Charlotte Islands.	52 00	132 00				Good black cod and halibut grounds; halibut as a rule larger than those caught farther south.
14		Southeast of Queen Charlotte Islands.	52 00	131 00				Do.
15		North of Queen Charlotte Islands.	55 00	133 00				Good halibut grounds; halibut as a rule larger than those caught farther south.
26		Off northern end of Graham Island.	54 10	132 30	600	25–40	Chiefly sand	Halibut; most abundant in the winter and fall months.
27		do	54 00	131 40	150	4– 5	Sand	Halibut; fishing dangerous; shoals and bars not located on charts, and vessels exposed to gales from the eastward.
28		Off banks, Goshen and Stephens islands.	53 30	130 30		6–35	Sand, shells, and patches of rock.	Halibut abundant during the winter months.
29		Around Gander Islands	52 35	129 25				Halibut found in abundance.
30	Attu Mackerel Bank.	Around Attu Island	52 45	[b]173 00				Mackerel inhabit this region in more or less quantities each year.
31		Around Atka Island	52 05	174 30				Mackerel.

[a] Reprinted from the pilot chart of the North Pacific Ocean for December, 1905.

[b] East.

THE COD FISHERY.

HISTORY.

The presence of cod along the Alaskan coast has been known for many years. The first mention was made by a Russian navigator in 1765, who reported "cod, perch, pilchards, smelts" as being found around the Fox Islands. Other navigators and explorers who reported the presence of cod were Cook (1786), Portlock (1787), Meares, Billings (1792), Langsdorf (1804), Sutke, and Sir George Simpson (1841), all of whom speak of it as being a very common fish. But little use was made of it, however, owing to the abundance of salmon. Early in the sixties American vessels from San Francisco discovered and fished on the cod banks in the Okhotsk Sea, the first American vessel to visit Alaskan waters apparently being the schooner *Alert*, which made a voyage to Bristol Bay in 1863. She secured but 9 tons of cod, however, the captain's principal incentive to make the trip probably being to trade with the natives.

On March 27, 1865, Captain Matthew Turner, with the schooner *Porpoise* (45 tons), of San Francisco, sailed for Alaska, and arrived at the Shumagin Islands May 1. The vessel returned on July 7 with 30 tons of cod, having left the banks early in order to get back to San Francisco before the Okhotsk fleet. This was the first fare ever taken from around the Shumagins, one of the best grounds in Alaska. The Simeonoff Bank was discovered by the *Minnie S. Atkins* in 1867.

The acquisition of Alaska by the United States in 1867 proved a boon to the cod fishermen, as it secured the Americans, who did all the fishing, from any interference on the part of the owners of Alaska. This is well shown by the fact that while the fleet in 1867 numbered 3 vessels, with a catch of 136,000 fish, the fleet of 1868 comprised 14 vessels, which made a catch of 608,000 fish.

It was early discovered that the time required for the vessels to reach the banks from San Francisco and return was wasted, and in 1876 T. W. McCollam & Co., which firm later merged into the Union Fish Company, one of the first to engage in the fishery on a large scale, established a permanent fishing station at Pirate Cove on Popoff Island, one of the Shumagin group. From this station fishermen in dories went out each day, returning in the evening with the day's catch. In this way fishing could be carried on the year through, and the plan was followed as time went on until now nearly all of the companies operating vessels in Alaska have one or more stations. Certain vessels are employed in carrying supplies to these stations from the home ports and in taking back the cod caught.

The first Alaskan vessel in the fishery was one owned by Captain Haley, of Wrangell, who in 1879 fished on the Hoochenoo Bank in Frederick Sound, and sold his catch in Wrangell for $100 per ton. The regular Bering Sea fishery was inaugurated by the *Tropic Bird* in 1883.

For years the fishery was followed by San Francisco firms only, but in 1891 Capt. J. A. Matheson, of Anacortes, Wash., brought the schooner *Lizzie Colby* (142 tons) around Cape Horn and sent her to Bering Sea, and he has continued in the fishery there ever since. The Western Canadian Fish Company, of Vancouver, British Columbia, sent a vessel to Bering Sea in 1903 and continued the venture until 1905, when the company failed. The Robinson Fisheries Company, of Anacortes, and the Seattle and Alaska Fish Company, of Seattle, sent their first vessels to Alaska in 1904. In 1905 King & Wing, of Seattle, and the Blom Codfish Company, of Tacoma, entered the fishery.

FISHING BANKS.

While most of the fishing banks were known to the fishermen in a general way, it remained for the steamer *Albatross* to survey and plat them during her investigations in Alaskan waters from 1888 to 1892.[a]

Following is a summarized description of the banks, first those in Bering Sea:

Slime Bank.—This is the first of the larger fishing grounds reached after entering Bering Sea through Unimak Pass. The bank begins directly off the Northwest Cape of Unimak Island, is elongate in shape, and follows approximately the trend of the adjacent coast to within a few miles of Amak Island, its inner margin lying only a short distance off the land. It is about 85 miles in length and 17 miles in average width, broadening somewhat at the eastern end; its total area is estimated at about 1,445 square miles, and the depths range from 20 to 50 fathoms. The bank derives its name from the presence of immense numbers of a large jelly-fish, measuring from 6 to 18 inches across the disk, and provided with long, slender tentacles having great stinging powers. These animals are not found upon the surface, but seem to occupy an intermediate zone toward the bottom, where at times they occasion much annoyance to the fishermen by becoming entangled with the fishing gear.

Baird or Moller Bank.—This is the largest bank yet discovered on the Alaskan coast. It commences a few miles east of Amak Island and extends northeastward off the northern side of the Alaska peninsula to the vicinity of Cape Chichago at the mouth of Ugaguk River, a distance of about 230 miles. It has an average width of about 40 miles and an extreme width of 58 miles, its total area being estimated at about 9,200 square miles. The boundaries have not been thoroughly established, and possibly comprise a greater area than is stated above.

In Kulukak Bay are numerous spots where cod are found, but none are of sufficient size to entitle them to be called banks.

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[a] Fishery investigations of the steamer *Albatross* from July 1, 1888, to July 1, 1892, by Richard Rathbun. Bull. U. S. Fish Com., 1892, p. 127-201.

Gravel Bank.—Fishermen sometimes visit this small bank, which lies about 16 miles southwest from the southern end of Hagemeister Island, and they state that large cod are abundant there. The depths are from 16 to 20 fathoms.

The *Albatross* investigations were not carried north of Cape Newenham. According to Petroff, in the Tenth Census, codfish have been reported at a few points along the Arctic coast, but no banks have been located, very likely because no effort has been made to find them.

Unalaska Harbor, etc.—Fishermen have reported cod banks in the neighborhood of Unalaska Harbor, but the investigations of the *Albatross* do not seem to sustain the claim. The cod fishing directly off Chernoffsky Bay is said to be excellent.

On the southern side of the Alaskan peninsula are the following banks:

Davidson Bank.—This bank was discovered about 1870 by Prof. George Davidson, of the United States Coast and Geodetic Survey, after whom it is named. It lies south of Unimak Island, and extends westward from the neighborhood of the Sannak Islands to about the longitude of the southern entrance to Unimak Pass (about longitude 164° 40′ W.). Its eastern end is continuous with the shoal water surrounding the Sannak Islands; its area was estimated at about 1,600 square miles.

Sannak Bank.—To the east and southeast of the islands of the same name lies Sannak Bank, somewhat elongate in shape and trending in a general way northeast and southwest. It is estimated to have an area of about 1,300 square miles.

The region between Sannak Bank and the Shumagin Islands was only partly surveyed, but about 1,800 square miles fairly well adapted to fishing were covered.

Shumagin Bank.—Lying to the south and southeast of the Shumagin Islands, with its outer margin following approximately the trend of the coast line formed by the adjacent islands, is Shumagin Bank, which has been traced westward to about longitude 159° 52′ W., but probably extends farther in that direction; east of the Shumagin Islands it reaches north to the latitude of Big Koniuji Island. Its width inside of the 100-fathom curve varies from 15 to 35 miles, while its area has been estimated at about 1,800 square miles.

From the Shumagin Islands to Kadiak Island the area was only partially surveyed, but the work done indicated the existence of several fishing banks.

Albatross Bank.—Off the southeastern side of Kadiak Island is Albatross Bank, extending the entire length of that island as well as in front of the Trinity Islands. At the eastern end it is practically continuous with Portlock Bank. Along some portions of the coast, as in the neighborhood of Sitkalidak Island, the bank is separated

from the land by comparatively deep water, while in other places shoal water intervenes. The 100-fathom curve is distant 25 to 45 miles from the land, inside of which limit there is an estimated area of 3,700 square miles.

Portlock Bank.—This bank extends northeastward from Kadiak Island in the direction of Middleton Island, a distance of about 120 miles, and is irregular in shape. It is the largest single bank south of the Alaska peninsula, its area inside of the 100-fathom curve being about 6,800 square miles.

The *Albatross* continued her investigations as far to the eastward as Middleton Island, but no banks were found.

Codfish have been reported in the western part of the Gulf of Alaska and in the waters of Southeast Alaska, but nowhere do there seem to be any banks which it would be profitable to work with vessels especially devoted to this fishery.

FISHING STATIONS.

At the present time nearly one-half of the codfish taken in Alaska are caught by fishermen from the numerous stations scattered along the Alaska peninsula and the islands adjacent thereto on the southern side. The business of fishing from stations has fluctuated considerably from year to year. The year 1892 was the banner year, 2,208,035 pounds of fish being taken by fishermen from stations, to 1,742,155 pounds secured by the fishing vessels. The stations soon after began to be abandoned, and for a few years but few were in operation. Of late years, however, they have regained their popularity, and it is probably only a question of a few years until all of the cod fishing outside of Bering Sea will be carried on from the shore stations. During the season of 1905 the following stations were operated.

Union Fish Company.—Pirate Cove, Popoff Island; Northwest Harbor, Big Koniuji Island; Sanborn Harbor, Wedge Cape, and Eagle Harbor, on Nagai Island; Pavlof Harbor and Johnsons Harbor, on Sannak Island.

Alaska Codfish Company.—Moffetts Cove and Companys Harbor, on Sannak Island; Dora Harbor, on Alaska peninsula; and Winchester and Banenhoff, on Unga Island.

Seattle-Alaska Fish Company.—Squaw Harbor, on Unga Island.

Aleutian Live Stock and Mining Company.—Lost Harbor, Akun Island.

This year (1906) the Pacific States Trading Company is erecting two stations on the Shumagin group.

Nearly all of these stations are open the whole year round, the fishermen going out in their dories each day when the weather is favorable, and but rarely having to go more than 5 miles from any of

the stations before good fishing grounds are reached. There is usually one man to a boat and trawl lines are quite generally employed, although a few hand lines are used. In good weather the trawls are hauled two or three times a day, but the fish are not dressed until the last haul for the day has been made.

When not out in the dories the fisherman's time is his own. He is paid from $25 to $30 per thousand fish of 26 or more inches in length, and he must dress and salt them. The wage is less for fish under 26 inches. The station owner furnishes the men with boats, lodging, food, and fuel, the fishermen providing only the fishing gear. The catch is kench cured, and later shipped away to San Francisco and Puget Sound ports on the transporting vessels, where the final curing is accomplished.

VESSEL FISHERIES.

Nearly all of the fleet fish in Bering Sea, where the banks are too far from the shore for shore fishing, or where harbors are not available.

With the exception of three vessels which use trawl lines, all fishing is with hand lines from dories, one man to a boat. The fishermen do not dress and salt their own catch, as is the custom on the Atlantic coast, but each vessel carries a dressing gang, varying with the number of fishermen, and a splitter and salter, who do this work. The captain usually receives about $125 per month; the cook, $75; the first mate, $40; the second mate, $35; the fishermen, $25 and $27 per 1,000 fish, according to the size; dressing gang, $25 per month each, and the splitter and salter, $75 per month. All hands get board also. When not engaged in their regular work the dressing gang usually fish over the side of the vessel and are paid $25 per 1,000 for all fish so caught. A vessel usually makes but one trip to the banks, leaving in the spring and returning in the late summer or early fall, but sometimes if she meets with good luck on her first trip she will make a second one. The fish are salted in bulk in the hold of the vessel, about 1 ton of salt being required for 1,000 fish, and the balance of the curing is done at the vessel's home port. The crew have nothing to do with unloading the vessel, that work being done by the employees at the home station.

The principal bait used in both shore and vessel fisheries is halibut, sculpins, and cuttlefish. In hand-lining only a small quantity of bait is brought on the vessels, because after the first few hours' fishing the shack fish brought up will suffice for baiting. For trawling, however, more bait is required, and the stations generally gather it at various places and furnish it to the fishermen either fresh or salted, as may be most convenient.

Certain of the vessels do nothing but ply between the stations and the home ports, bringing up supplies and carrying back the salted fish. These vessels make from three to four trips a year.

But few of the tongues, sounds, and livers of the cod are saved, either in shore or vessel fisheries.

STATISTICS.

The table below shows, by years, the condition of the fishery since its inception, in 1863. An interesting feature of this table is that while the average cured weight of a codfish was slightly over $2\frac{3}{4}$ pounds in 1868, in 1905 the average had risen to 4 pounds. This is due to the fact that the vessels now work largely on the outer banks, where the fish are larger than on the banks close to shore, which were the ones from which most of the fish came in the early days of the fishery. For some years the fishery was almost stationary, owing to the lack of an expanding market for Pacific cod, but during the past five years the demand has been quite heavy and has resulted in a considerable increase in the fleet and a corresponding increase in the catch.

VESSELS ENGAGED IN COD FISHING IN ALASKAN WATERS, TOGETHER WITH THE QUANTITY AND VALUE OF COD TAKEN, 1863 TO 1905.

Year.	Vessels.	Fish taken.	Salted weight.	Value.	Year.	Vessels.	Fish taken.	Salted weight.	Value.
			Pounds.					*Pounds.*	
1863 [a]	1	6,000	18,000	$2,340	1886	7	794,000	2,382,000	$83,370
1865 [b]	1	24,000	60,000	7,800	1887	6	795,000	2,385,000	71,550
1866	2	40,000	90,000	11,700	1888 [h]	6	735,000	2,386,000	59,847
1867	3	136,000	340,000	42,500	1889	4	520,000	1,560,000	39,150
1868	14	608,000	1,684,480	202,138	1890	4	771,580	2,314,740	57,868
1869	8	412,800	1,032,000	92,880	1891 [i]	8	1,188,000	3,751,711	93,793
1870	10	506,200	1,265,500	82,258	1892	6	1,312,000	3,936,000	118,080
1871	6	304,800	914,400	64,008	1893 [j]	6	1,216,000	3,648,000	109,440
1872	3	120,000	360,000	25,200	1894	5	894,000	2,682,000	80,460
1873	4	220,000	660,000	39,600	1895	6	847,637	2,542,910	76,290
1874	4	152,400	457,200	27,432	1896	9	728,000	2,184,000	76,440
1875	4	201,600	604,800	42,336	1897	10	1,065,000	3,195,000	127,800
1876 [c]	6	303,200	909,600	54,576	1898	10	817,000	2,451,000	122,550
1877	7	300,000	900,000	45,000	1899	11	1,377,000	5,508,000	206,550
1878 [d]	9	524,000	1,574,000	78,700	1900	10	1,565,725	6,067,000	218,550
1879	10	696,000	2,088,000	83,520	1901	10	1,504,000	6,016,000	180,480
1880 [e]	5	289,000	867,000	43,350	1902 [k]	12	2,248,000	8,992,000	269,760
1881	3	297,000	891,000	44,550	1903 [l]	13	2,177,000	8,708,000	261,240
1882 [f]	9	529,000	1,587,000	63,480	1904	16	2,742,111	11,064,944	261,316
1883 [g]	9	737,000	2,211,000	88,440	1905 [m]	21	3,030,836	12,123,344	303,084
1884	5	655,000	1,965,000	98,250					
1885	8	881,000	2,643,000	79,290	Total		34,270,889	117,019,629	4,136,966

[a] First vessel to fish for cod in Bristol Bay.
[b] Beginning of the Shumagin Islands fishing.
[c] Shore fishing station established at Pirate Cove.
[d] One vessel lost.
[e] Schooner Nagay lost in the spring.
[f] Schooners General Miller and H. L. Tiernan lost.
[g] Schooner Wild Gazelle lost.
[h] Schooner Isabel lost with 14 men.
[i] Schooner Dashing Wave lost.
[j] Schooner John Hancock lost.
[k] Schooner Anna lost with full cargo.
[l] Includes schooner Blakeley, of Vancouver, British Columbia; 2 Seattle (Wash.) firms began this year; schooner Mary and Ida lost with 78,000 fish.
[m] Schooner Pearl lost with 30 men; schooner Nellie Coleman lost with all on board.

THE HALIBUT FISHERY.

HISTORY.

The halibut is now one of the most extensively sought species in our commercial fisheries. For many years the Atlantic banks amply supplied the constantly growing demand, but ultimately these began to show the effects of the heavy drain upon them, and then the important eastern fishing companies began to turn their attention to the Pacific, where large banks had been reported.

The inception of the industry on the Pacific coast may be said to have been about twenty-one years ago, when several schooners from Port Townsend, Wash., began to fish off Cape Flattery, but their catches were small. A few years later an eastern fish firm established a branch at Tacoma, which caused a transfer of the business almost entirely to that city. In the meantime, a demand had been created in the West for Pacific halibut, and in a few years more the fish houses of Seattle began to compete for the fish caught by the schooners, with the result that the trade shifted to that city, and the bulk of the schooner trade has been done there ever since. At the present time the International Fisheries Company, of Tacoma, a connection of an eastern house, handles the bulk of the steamer trade on the American side, while the New England Fish Company, of Vancouver, British Columbia, handles the bulk of the steamer trade on the Canadian side. The latter company, however, is an American corporation, with American-built vessels, and nearly all of its catch enters this country in bond free of duty. Both companies have special arrangements with the transcontinental lines by which their fish, fresh in refrigerator cars, are rushed through by passenger service, thus enabling the companies to place the fish on the Boston and Gloucester markets in from six to seven days after it is landed on the coast.

The New England Fish Company was the first to employ steamers in the fishery, beginning in 1897. At present it operates three steamers, while the Tacoma company has four steamers employed in fishing and transporting. Within the last year several steamers and power boats have been fitted out at Seattle to engage in the industry.

It was about 1895 when the southeast Alaska banks began to be resorted to by Seattle schooners in the winter, it not being possible to do anything on the Cape Flattery banks at that season of the year, and the British Columbia banks being closed to them. Most of the vessels fished around Dixons Entrance, while others worked in Chatham Strait and Frederick Sound, the latter making their headquarters in Wrangell Narrows and shipping the fish to Puget Sound ports on the regular steamers. The fishing was quite desultory, how-

ever, until 1899, when the Icy Strait Packing Company built a salmon cannery and a wharf at Petersburg, near the upper end of Wrangell Narrows, and arranged with the steamship companies to make regular calls for freight. From that time on the business rapidly concentrated at Petersburg, until now nearly all of the vessels make it their headquarters.

Since then a great development of the Alaskan halibut fisheries has occurred. In addition to the Seattle fleet, which comes up each winter to remain during the season, a few Alaskan sail and power vessels have entered the fishery. A considerable part of the business, however, is conducted on entirely different lines. A company or individual builds its plant in some place convenient to the fisheries and engages crews to go out in dories from day to day. Some have one central station and a number of subsidiary stations and employ a steamer to carry supplies from the former to the latter and bring back the fish caught. The principal halibut stations are Tee Harbor, Taku Harbor, Pleasant Bay, Wrangell Narrows, Ketchikan, Kake, Hoonah Village, Juneau, Fanshaw, Windom, and Farragut bays. At Tee Harbor and Taku Harbor large cold-storage plants are in operation in which the fish are frozen for shipment.

In addition to the wharf at Petersburg there were located in Wrangell Narrows in 1905 three large scows, each capable of taking care of from 200 to 400 boxes of halibut at a time. The schooners find it much easier to come alongside and discharge on these scows than on the wharf, while the steamer has very little difficulty in transferring the boxes from the scow to its hold. The scows are resorted to almost exclusively by the schooners and other sailing vessels from Seattle. Most of the steamers and power boats that fish in Alaskan waters in winter return to their home port to unload as soon as a fare has been secured. They usually make about two trips a month to the banks.

FISHING GROUNDS.

In the Pacific the halibut ranges from Bering Sea on the north, as far as present knowledge extends, to San Francisco and the Farallones on the south. According to the observations of Dr. T. H. Bean, the center of abundance is in the Gulf of Alaska, particularly off Kadiak and the Shumagin islands. Outside of Alaska the principal bank near American territory is found off Cape Flattery, in the mouth of the Straits of Fuca, in the state of Washington. Practically the entire catch by American vessels during the summer is made on this bank. In the winter months the supply comes entirely from scattering banks in southeastern Alaska, or from banks on the British Columbia coast outside the three-mile limit.

Of the former banks, Mr. A. B. Alexander[a], formerly fishery expert of the steamer *Albatross*, writes as follows:

Across Dixon Entrance, on the south side of Prince of Wales Island, in the vicinity of Nicholas Bay and Cape Chacon, a few schooners have taken good fares. Here, as at Cape Scott, the ground is made up of small "spots," which can only be located by landmarks. Only a few vessels can fish on this ground; it is said that even a small fleet would soon exhaust the ground, not permanently, but for some weeks. The Indians of this locality catch halibut here in considerable numbers, and from these people the white fishermen soon learn the best places.

* * * * * * *

Halibut on the northern banks are sometimes very erratic; in places where they are numerous one day few will be found the next. It frequently happens that a vessel will have good success for several days, and in a few hours' time fish will become so scarce that it is useless to remain longer on the ground. It is thought the fish are traveling in schools from one bank to another.

On all grounds halibut are more plentiful in winter than in summer and are scarcer in June than at any other time of the year. At this season they scatter all over.

During the salmon-canning season (June to November) many halibut are to be seen near the canneries, where they feed on the salmon offal thrown overboard.

No effort has yet been made to fish the large banks in central and western Alaska, owing to the distance from markets and the poor shipping facilities, but ultimately these will furnish the bulk of the product.

Very important grounds are located off the Queen Charlotte Islands and along the coast of British Columbia, but most of these are barred to American fishermen because they are within the three-mile limit.

It is barely possible that more extensive investigation would reveal the presence in southeast Alaska of large banks similar to those off the British Columbia coast.

METHODS OF THE FISHERY.

The method of catching halibut is almost the same as on the Atlantic coast. When the grounds are reached, the vessel scatters its dories around in favorable spots and then lies to for a while. There are generally two men to a dory. First the buoy is launched and the buoy line thrown out, this line being usually about 150 feet in length with an anchor attached to the end. The trawl lines in the vessel fisheries are generally about 1,800 feet in length, and usually three are joined together so as to make one continuous line. The gangings are about 5 feet long, are attached to the ground line, and are placed about 15 feet apart. They have the hooks and bait (usually herring) attached, and are placed so as to rest on the bottom.

[a] Notes on the halibut fishery of the northwest coast in 1895, by A. B. Alexander. Bull. U. S. Fish Com., vol. XVII, 1897 (1898), p. 141-144.

As soon as the buoy-line anchor has reached the bottom, the trawl is thrown from the side of the dory, and considerable skill is then necessary in order to place the trawl so that it will cover as much ground as possible and at the same time not get tangled up and crossed. In lifting the trawl the buoy line, with anchor, is taken in first and then the trawl. Sometimes a hurdy-gurdy (small windlass) is used in this work in order to facilitate matters. The fish are hauled to the surface, hit on the head with a club, unhooked, and thrown into the dory. Various other species besides the halibut are secured, but nearly all are thrown away. One of the greatest pests in the halibut fisheries of the Pacific, as well as of the Atlantic, is the dogfish, many of which get caught on the lines. They range in weight from 8 to 20 pounds, and are utterly valueless to the fishermen.

In the dory fishing from the regular Alaska shore stations the fishermen generally use 6 lines of about 150 feet each to each skate of gear, and 2 skates are used to a dory. Generally one skate is set out in the morning and the other in the afternoon. As a general thing the lines are set from one and a half to two hours and then taken up in the manner described above.

Hand lines, occasionally employed by the white fishermen, are nearly always used by the natives, who attach hooks of a very primitive but quite effective shape.

On the steamers the fishermen are generally paid from 20 to 25 cents apiece for the fish caught, the owner of the vessel furnishing everything necessary for carrying on the fishery, including provisions. The fisherman receives the same price for a small fish as for a large one. On the schooners the fishing is generally done on shares, the vessel as a usual thing taking one-third and the crew the balance. Under this plan all the living expenses are taken from the returns before the division is made. The boat furnishes the gear.

PREPARATION OF THE CATCH.

In shipping fresh fish the entrails are removed and the fish packed in ice in boxes holding about 500 pounds net weight. The ice used is gathered from the neighboring glaciers, and is in the best form for use if ground in a mill made for the purpose, but often it is merely broken into fine lumps with a club.

The large halibut and those secured where the opportunities for shipping are infrequent are fletched. In this process the two sides are taken off in two complete pieces, which are then put into bins and buried in salt so that the brine will run off. Here they remain from eight to ten days and are then repacked, being resalted if necessary, and allowed to remain until cured, when they are packed in boxes for shipment. A considerable part of this work is done during the summer months when it is not profitable to ship halibut fresh.

Large quantities of halibut are prepared each year by the Indians for food in the winter season. The fish are cut in strips, partially dried in the open air, and then suspended in the smoke from the fires generally built on the floor in the center of most of the Indian houses.

The possibility of developing an important and profitable industry in the canning of halibut has often been canvassed in Alaska, but the difficulty of interesting capital in an untried industry, when the profits of salmon canning have been so sure for many years, has usually been too great for the promoters. The first halibut canned in Alaska were put up at the Klawak cannery in 1878, when 200 or 300 cases of 2-pound cans (2 dozen cans in a case) were packed. This venture was continued for a few seasons, not more than 300 cases of 2-pound cans being packed in any one season, and then abandoned owing to the lack of a market for the product. In the summer of 1904 the Alaska Fish and Halibut Company opened a small cannery on Wrangell Narrows, just above Tonka, and put up an experimental pack of 41 cases of 1-pound flats (48 cans to the case). Some of the cases were shipped to Boston and other eastern points, and the balance distributed on the Pacific coast, where they have met with a very good reception. If the results of the experiment justify it, the company expects to put up a one-line cannery to be devoted exclusively to the packing of halibut. During the winter of 1904–5 the Juneau Packing Company, of Juneau, put up 36 1-pound cans as an experiment, and expects to enter into the business on a large scale should the goods meet with a favorable reception. The writer had an opportunity to see and taste these goods, and found them both pleasant to the eye and agreeable to the taste. The West Point Packing Company, at Petersburg, expected to put up a small pack in the winter of 1905–6.

One very favorable feature of this industry, if it be established, is that it can be prosecuted at all seasons of the year. Salmon canneries could be utilized when not engaged in the packing of salmon, thus saving the initial cost of a plant put up especially for halibut. The salmon canning season begins in June usually, and, with the exception of a few plants, closes by October. Halibut are most abundant during the winter months, the very season when the salmon canneries are shut down.

The Juneau Packing Company, of Juneau, put up a large smokehouse during 1904, and is now engaged in the smoking of halibut, herring, and salmon. The greater part of its prepared product is shipped to Puget Sound ports.

THE HERRING FISHERY.

HISTORY.

As early as 1878 persons in Wrangell engaged in the business of catching herring, from which they extracted the oil, in addition to salting and drying the fish. In 1880 the Western Fur and Trading Company, at their St. Paul (Kadiak Island) fishery, put up 500 boxes (30 pounds each) of smoked herring and 25 one-quarter barrels and 100 kits of salted herring.

The fertilizer plant at Killisnoo, on the island of Kenasnow, close to the western shore of Admiralty Island, owned and operated by the Alaska Oil and Guano Company, is the largest and oldest concern engaged in the herring fisheries. In 1882 the Northwest Trading Company, the predecessor of the present company, established at Killisnoo a small plant for extracting oil. As it proved successful it was gradually enlarged, and in 1884 the plant for the manufacture of guano was installed. The works at present are quite extensive, with commodious storehouses and a fine wharf. The common barrels used are made on the premises by machinery. As the fish while breeding are very poor and furnish no oil, the factory does not begin to operate until June, by which time the fish are feeding again and have commenced to fatten. In June it is estimated that one barrel of fish will furnish about half a gallon of oil; from this time the quantity obtained increases, until in the early part of September one barrel of fish produces about 3½ gallons of oil. It then begins to decrease until in December a barrel of fish will produce about 2 gallons of oil. The factory is generally operated from June to December. The season is frequently shorter, however; in 1905 it ran from June to October. Three steamers are employed and the fish are taken by means of purse seines. A few herring are salted each season, also.

During the season of 1905 the Alaska Fish and Development Company, of Pleasant Bay, on Glass Peninsula, installed a fertilizer plant aboard a large hulk anchored in the bay, but they were unable to get it in readiness to operate before the season closed. They put up a considerable quantity of salted herring, however. In 1904 this company operated a trap net for herring in the bay, but it was not set in 1905.

From 1899 on, various companies and individuals put up salted herring at points along the coast south of the Aleutian chain. The fishing in Norton Sound and on the Yukon River is done by natives with seines, and the fish caught are either consumed locally or exchanged with the interior tribes for other articles.

On June 15, 1904, the sardine cannery of the Juneau Packing Company was opened at Juneau, and during the balance of the year put

up 3,173 cases of one-quarter oil and three-quarters mustard sardines, valued at $12,059. These were prepared from young herring. None were packed in 1905, owing to inability to compete with the excessively low prices quoted for eastern sardines. As the prices of the latter have gone up to a normal figure again, it is probable that it will now be profitable to operate the cannery. The company also put up smoked and salted herring in addition to other fishes.

There is room for a very great development of the herring industry. For many years salmon absorbed all the attention and capital, but since the slump in profits in the latter business during the last four years more attention has been directed to herring.

FISHING GROUNDS.

Herring are found in abundance at certain seasons of the year at many places on the Alaskan coast south of Bering Straits. They are rather erratic in their movements, however, being in one place especially abundant one year and totally absent the next, possibly returning again after several seasons in greater numbers than before. In southeast Alaska the herring arrive in April for the purpose of breeding, and deposit their eggs in countless numbers in the sea grass and rockweed near shore and on boughs of trees along the beaches near low-water mark. For many years the inlet at Kootznahoo, on Chatham Strait, was the favorite resort for herring, but they are much less abundant now, owing, it is claimed, to the constant fishing for them with purse seines, which breaks up the schools and drives them away. The northern shore of Kuiu Island and Gastineau Channel are also favorite spots, although the fish have been rather scarce in the latter place the last two seasons. They are quite abundant in Yakutat Bay, while Seldovia or Herring Bay, just inside the mouth of Cook Inlet, is a famous resort for them, immense schools making their appearance here each spring and autumn. About the middle of August large schools usually appear in the vicinity of Kadiak Island, and Captains Harbor, Unalaska Island, is frequented at certain seasons by large schools of exceedingly fat herring. Herring usually begin to arrive in the Yukon River from the 5th to the 20th of June. The run in Norton Sound is of very short duration, the fishing lasting only a fortnight, but the schools are said to be enormously large.

STATISTICS.

The table on page 22 shows the condition of the herring fishery from 1878, the first year for which reliable data could be secured. This table is not complete by any means, as salteries frequently spring up and are gone in a season, leaving no trace behind as to what they did.

Extent of the Herring Fisheries of Alaska, 1878 to 1905.

Year.	Fish utilized.	Products prepared.					
		Pickled.				Smoked.	
		Half barrels.		Barrels.			
	Pounds.	*Number.*	*Value.*	*Number.*	*Value.*	*Pounds.*	*Value.*
1878	37,500			150	$900		
1879	25,000			100	650		
1880	27,900			19	133	15,000	$750
1881							
1882	3,040,000						
1883	8,400,000						
1884	13,200,000						
1885	17,000,000						
1886	22,000,000						
1887	22,200,000						
1888	6,000,000						
1889	10,492,000						
1890	10,485,000						
1891	17,644,400	1,000	$3,750				
1892	18,716,000						
1893	14,450,000						
1894	15,306,000	1,000	3,500				
1895	6,510,000	500	1,750				
1896	5,550,000	250	875				
1897	7,120,000	950	2,850				
1898	9,048,000	1,300	3,900				
1899	8,110,000	1,650	4,950	3,200	16,000		
1900	13,006,250	185	555	3,885	19,425		
1901	14,600,000	400	1,200	8,000	40,000		
1902	9,546,800			5,490	27,450		
1903	13,689,000	710	2,130	2,225	11,125		
1904	15,963,500	150	450	2,250	11,250	450	50
1905	15,109,113	375	1,115	9,216	46,200	24,435	1,534
Total	297,276,463	8,470	27,025	31,535	173,133	39,885	2,334

Year.	Products prepared—Continued.						Total value.
	Sardines (canned).		Oil.		Guano.		
	Cases.	*Value.*	*Gallons.*	*Value.*	*Pounds.*	*Value.*	
1878							$900
1879							650
1880							883
1881							
1882			30,000	$7,500			7,500
1883			81,000	20,500			20,500
1884			192,000	48,000	1,200,000	$16,800	64,800
1885			300,000	75,000	(a)	(a)	75,000
1886			368,000	92,000	(a)	(a)	92,000
1887			335,000	83,750	(a)	(a)	83,750
1888			100,000	25,000	(a)	(a)	25,000
1889			157,900	39,475			39,475
1890			156,750	39,188			39,188
1891			242,050	60,513	1,600,000	22,275	86,538
1892			318,900	79,725	1,400,000	15,400	95,125
1893			223,450	55,863	1,800,000	22,500	78,363
1894			234,350	58,588	1,600,000	16,000	78,088
1895			101,650	22,363	1,000,000	10,000	34,113
1896			90,650	20,850	1,100,000	11,000	32,725
1897			125,000	31,250	1,560,000	17,600	51,700
1898			165,500	33,375	1,772,000	14,962	52,237
1899			128,000	25,600	1,428,000	12,852	59,402
1900			172,000	34,000	2,388,000	26,400	80,380
1901			200,000	50,000	2,500,000	33,750	124,950
1902			117,250	36,175	1,624,000	25,360	88,985
1903			146,250	39,473	2,688,000	33,600	86,328
1904	3,173	$12,059	152,500	41,375	3,041,800	38,125	103,309
1905			143,220	35,805	2,618,000	32,725	117,379
Total	3,173	12,059	4,281,420	1,055,368	29,319,800	349,349	1,619,268

a No record.

THE SALMON INDUSTRY.[a]

CANNERIES.

The first two canneries in Alaska were built in the spring of 1878—one at the Redoubt, Old Sitka, and the other at Klawak, both in Southeast Alaska. The latter was built by the North Pacific Trading and Packing Company, which still operates it. In Central Alaska the first cannery was built in 1882 at Karluk. The first in Western Alaska (Bristol Bay region) was constructed on the Nushagak River in 1884. By 1889 there were 37 canneries in operation, with a total output of 719,196 cases, a flood of canned salmon which was too much for the markets, so that by 1892 the number of canneries had fallen to 15, with an output of 474,717 cases. From this time on there was a gradual increase until 1902, when there were 64 establishments in operation, packing 2,545,298 cases; but the low prices prevailing during the last few years, owing to excessive competition, again reduced the number very materially, and in 1905 there were but 47 canneries, which put up 1,894,516 cases. The table below shows by sections and years the number of canneries operated and the pack. It has been found impossible to give the value of the pack, owing to the wide fluctuations in price and the fact that establishments frequently held their pack for several seasons before disposing of it.

Pack of Canned Salmon in Alaska, 1878 to 1905.

Year.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Canneries.	Pack.	Canneries.	Pack.	Canneries.	Pack.	Canneries.	Pack.
		Cases.		Cases.		Cases.		Cases.
1878	2	8,159					2	8,159
1879	2	12,530					2	12,530
1880	1	6,539					1	6,539
1881	1	8,977					1	8,977
1882	1	11,501	2	10,244			3	21,745
1883	4	20,040	2	28,297			6	48,337
1884	4	22,189	2	42,297	1	[b] 400	7	64,886
1885	3	16,728	2	52,687	1	14,000	6	83,415
1886	4	18,660	2	74,583	3	48,822	9	142,065
1887	5	31,462	2	102,515	3	72,700	10	206,677
1888	6	81,128	6	241,101	4	89,886	16	412,115
1889	12	141,760	21	461,451	4	115,985	37	719,196
1890	12	142,901	19	421,300	4	118,390	35	682,591
1891	11	156,615	14	511,367	5	133,418	30	801,400
1892	7	115,722	6	295,496	2	63,499	15	474,717
1893	8	136,053	11	399,815	3	107,786	22	643,654
1894	7	142,544	10	435,052	4	108,844	21	686,440
1895	7	148,476	10	327,919	6	150,135	23	626,530
1896	9	262,381	12	485,990	8	218,336	29	966,707
1897	9	271,867	13	382,899	7	254,312	29	909,078
1898	9	251,385	14	395,009	7	318,703	30	965,097
1899	9	310,219	14	356,095	9	411,832	32	1,078,146
1900	16	456,639	14	492,223	12	599,277	42	1,548,139
1901	21	742,914	13	562,142	21	719,213	55	2,024,269
1902	26	915,150	12	583,690	26	1,046,458	64	2,545,298
1903	21	645,232	12	417,175	27	1,186,730	60	2,249,137
1904	12	464,545	11	499,485	32	989,716	55	1,953,746
1905	13	433,607	9	371,755	25	1,089,154	47	1,894,516
Total		5,975,923		7,950,587		7,857,596		21,784,106

[a] No effort is made to give a detailed history of the fishery or of the methods followed, as these have been treated of, quite at length, in the publications of the Bureau and in the yearly reports of the agents appointed by the government to see that the salmon law is enforced.

[b] Experimental pack.

SALTERIES.

The oldest Alaska salmon saltery now in existence is that established by Baronovich, a Greek or Slav, who had married the daughter of Skowl, one of the old-time chiefs of the Kasaans, and received from him the fishery on Karta Bay now known as Baronovich's Fishery. The saltery is operated only occasionally now.

The table below shows the pack of salted salmon since 1868. The salt salmon trade was so overshadowed by its giant brother, the canned trade, that it is frequently lost sight of or swallowed up in the latter. As a result it has been an exceedingly difficult matter to secure accurate data, and it is probable that a considerable part of the trade, especially in the earlier years, has been overlooked. The preparing of dry-salted dog salmon for market was first attempted in 1899. In 1900 a number of persons rushed into the business and overstocked the market, with the result that the industry became unprofitable and nothing was attempted for two seasons, when the demands of the Japanese trade for a cheap dry-salted fish caused a revival of the business. From 225 to 250 dog salmon are required to make a prepared ton of dry salted. These are packed in boxes holding about 560 pounds net. Fifteen pounds of salt are required to a box of fish, while the box itself weighs 95 pounds.

Pack of Salted Salmon in Alaska, 1868 to 1905.

Year.	Salmon.		Salmon bellies.		Dry-salted salmon.	
	Barrels.	Value.	Barrels.	Value.	Pounds.	Value.
1868	2,000	$16,000				
1869	1,700	13,600				
1870	1,800	14,400				
1871	700	6,300				
1872	1,000	9,000				
1873	900	7,200				
1874	1,400	11,200				
1875	1,200	9,600				
1876	1,800	14,400				
1877	1,950	15,700				
1878	2,100	16,800				
1879	3,500	28,000				
1880	3,700	29,600	300	$3,300		
1881	1,760	15,840				
1882	5,890	53,010				
1883	7,251	65,259				
1884	6,106	54,954				
1885	3,230	29,070				
1886	4,861	43,749				
1887	3,978	35,802				
1888	9,500	85,500				
1889	6,457	58,013				
1890	18,039	162,351				
1891	8,913	71,304				
1892	17,374	140,057	53	815		
1893	24,005	120,083				
1894	32,011	176,060				
1895	14,234	85,404				
1896	9,314	65,198	150	1,200		
1897	15,848	110,936	2,846	28,460		
1898	22,670	181,360	580	5,800		
1899	22,382	167,865	235	2,350		
1900	31,852	238,890	2,353	23,530	511,400	$10,228
1901	24,477	171,339	652	3,816		
1902	30,384	212,688	328	2,952		
1903	27,921	223,368	3,667	32,973	300,000	5,500
1904	13,674	89,209	208	1,950	966,812	16,180
1905	19,071	143,811	1,360	11,355	7,280,234	115,643
Total	404,952	3,108,952	12,732	118,501	9,058,446	147,551

FREEZING SALMON.

The preparing of frozen salmon began in 1902. The San Juan Fishing and Packing Company, soon to be succeeded by the Pacific Cold Storage Company, put up a cannery and cold-storage plant at Taku Harbor, Southeast Alaska, in 1901, though it did not operate the cold-storage portion until 1902. The quantity prepared that year was not reported by the company. It appears that in 1903 the pack was valued at $50,000 and in 1904, 57,427 pounds were frozen. In 1905 the pack was as follows: King salmon, 21,643 pounds, valued at $866; silver salmon, 22,334 pounds, $893; pink salmon, 16,348 pounds, $654, and steelhead trout, 12,306 pounds, $738. Nearly all of this frozen fish is shipped to Europe.

The season of 1905 witnessed the inception of a new branch of the salmon fishery. About the middle of January king salmon were observed in the vicinity of Ketchikan, but it was not until January 23 that the first fish were brought to this place for sale. News of the heavy run of fish having spread very rapidly, there were soon a large number of whites and Indians out in canoes catching them. The fish were feeding on the schools of young herring, and as they were close to the reefs nets could not be employed, and trolling lines were brought into use. At first herring bait was employed, but it was soon discovered that a nickel trolling spoon would answer the purpose just as well. The vicinity of Point Comano and Point Stewart seemed to be favorite spots for the fish, but they were to be found almost everywhere within a radius of 50 miles from Ketchikan. Several firms in Ketchikan early saw the financial possibilities of the business and soon had out steamers and launches to collect the fish from the fishing boats and bring them to Ketchikan to be packed in ice and shipped to Puget Sound ports. The fish averaged 25 pounds in weight. One weighed 77 pounds and several 75 pounds each. About 25 per cent of the catch consisted of white-meat fish and 75 per cent of red-meat fish. For the former the fishermen were paid 25 cents each and for the latter 50 cents each. During the run, which lasted until May 18, 271,644 pounds, valued at $15,600, were shipped. A considerable quantity was cured by the Indians for their own use also.

HATCHERIES.

A few of the more far-sighted cannerymen early saw the necessity of repairing, by artificial means, the enormous drain upon the supply of salmon caused by the large number of canneries in operation. In 1891 the several canneries in operation at Karluk combined forces and built a hatchery on the lagoon at that place. There were 2,500,000 eggs taken, but owing to bad water, crude appliances, and want of experience, only about 500,000 fish were hatched. As the cannerymen could not agree in regard to fishing operations in 1892, the

hatchery scheme also fell through and the plant was closed up. In that year Mr. John C. Callbreath, manager of the Point Ellis cannery, on Kuiu Island, operated a small hatchery on the left bank of Kutlakoo stream. It was a very primitive affair, the work all being conducted without shelter. About 1,000,000 eggs were fertilized and placed in the baskets, but after they commenced hatching an exceptionally high September tide destroyed the plant and it was never rebuilt. During the spring of the same year the Point Ellis cannery burned, and Mr. Callbreath, after seeing to the operation of the hatchery, returned to Wrangell to engage in business. Here his attention was attracted again to hatchery work and he made arrangements with the Indians for the right to Jadjeska stream, which empties into McHenry Inlet on Etolin Island, and in the fall of 1892 built a small hatchery about 200 yards from the mouth of the stream. The stream is about one-half mile in length and is the outlet of a small lake 42 feet above tide water. Finding the location unsuitable, Mr. Callbreath removed the hatchery in 1893 to the northern side of the lake, about three-eighths of a mile from the head of the outlet, where it at present stands. This hatchery is a private enterprise, being unconnected with any cannery or fishery, and is supported wholly by its public spirited and enterprising owner.

In 1896 the Baranof Packing Company, which operated a cannery on Redfish Bay, on the western coast of Baranof Island, built a small hatchery on the lake at the head of Redfish Stream. When 200,000 eggs were in the water very cold weather set in and not only froze the flume solid, but also froze the whole cataract. As the hatchery was thus left without water, the eggs were put into the lake and left to their fate and the hatchery closed down permanently.

In May, 1896, the Alaska Packers' Association broke ground for a hatchery at the eastern end of the Karluk lagoon, near the outlet of Karluk River, and but a short distance from where the hatchery was located in 1891. This was the first large hatchery built in Alaska and at the start had a capacity of several million eggs, which was largely increased from season to season for some years until in 1905 it had a capacity of about 40,000,000.

In 1897 the North Pacific Trading and Packing Company, at Klawak, Prince of Wales Island, established a hatchery near the head of Klawak stream, close to Klawak Lake. In 1898 the establishment was moved to the mouth of Threemile stream, a lake feeder on the northern side.

The Pacific Steam Whaling Company in 1898 erected a small hatchery on Hetta stream on the west side of Prince of Wales Island, which was operated until the close of the hatching season of 1903–4, when the Pacific Packing and Navigation Company, successor to the original owner, went into the hands of a receiver. This company was the owner of two other small hatcheries also, both built in 1901, one on the stream entering Mink arm of Quadra Bay, on the mainland, and

one on a stream entering Freshwater Lake Bay, Chatham Strait. These likewise closed when the company failed.

In 1901 the Alaska Packers' Association erected a hatchery on Heckman Lake, the third of a series of lakes on Naha Stream, and about 8 miles from Loring, where the association has a cannery. The association has expended a great deal of money on this hatchery and has made it the largest and most expensive in the world. At present it has a capacity of 110,000,000 eggs, but it has never been possible to secure enough to fill it.

The Union Packing Company, at Kell Bay, on Kuiu Island, and Mr. F. C. Barnes, at Lake Bay, on Prince of Wales Island, in 1902 built and operated small hatcheries, but with very indifferent success, and both abandoned the attempt after one season's work.

In 1905 the United States Bureau of Fisheries took up the work of hatching in Alaska, and began the erection of a hatchery on McDonald Lake, which empties through a short stream into Yes Bay, on Cleveland Peninsula. As the hatchery proper was not far enough complete to operate when the time for stripping came, in September, the eggs secured were placed in the flume built to bring the water to the hatchery.

Five hatcheries were in operation in 1905–6, and the value of these, together with the Hetta hatchery, which is in condition to operate at any time, is about $315,000.

The table below shows the hatcheries which operated successfully from 1892 or at least one season, and gives the number of eggs secured and the number of fry liberated each season. This represents almost wholly redfish, but a few million cohoes having been hatched. The periods represented are fiscal years, because the spawning season, the winter months, covers parts of two calendar years.

OUTPUT OF THE SALMON HATCHERIES OF ALASKA, 1893 TO 1906.

Year ended June 30—	Callbreath's hatchery.		Karluk hatchery.		Klawak hatchery.	
	Eggs taken.	Fry liberated	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.
1893	900,000	600,000				
1894	3,000,000	2,204,000				
1895	6,300,000	5,291,000				
1896	6,200,000	5,475,000				
1897	5,400,000	4,390,000	3,236,000	2,556,440		
1898	3,400,000	2,526,000	8,454,000	6,340,000	2,023,000	800,000
1899	3,000,000	2,050,000	4,491,000	3,369,000	3,600,000	3,000,000
1900	3,400,000	2,335,000	10,496,900	7,872,000	3,600,000	[a] 1,000,000
1901	([b])		19,334,000	15,566,800	([c])	
1902	6,000,000	5,500,000	32,800,000	28,700,000	3,500,000	2,800,000
1903	6,000,000	5,000,000	23,400,000	17,555,000	3,500,000	1,500,000
1904	6,000,000	5,000,000	28,113,000	22,000,000	3,000,000	1,700,000
1905	6,050,000	5,250,000	45,500,000	33,670,000	2,800,000	2,000,000
1906 [d]	7,700,000	6,500,000	36,933,000	32,501,040	2,800,000	2,000,000
Total	[e] 63,350,000	52,121,000	212,757,900	170,130,280	24,823,000	14,800,000

[a] A hard freeze killed most of the eggs.
[b] None stripped.
[c] Eggs all frozen.
[d] As the take of eggs for 1905–6 had not been hatched out when this report was prepared, the number of fry had to be estimated.
[e] The number of eggs taken in each season at this hatchery has been estimated.

OUTPUT OF THE SALMON HATCHERIES OF ALASKA, 1893 TO 1906—Continued.

Year ended June 30—	Hetta hatchery.		Quadra Bay hatchery.		Freshwater Bay hatchery.		Fortmann hatchery.	
	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.
1893								
1894								
1895								
1896								
1897								
1898								
1899	2,800,000	2,600,000						
1900	2,000,000	1,500,000						
1901	1,800,000	[a] 500,000						
1902	2,500,000	1,700,000	4,500,000	3,500,000	1,500,000	1,000,000	11,460,000	10,300,000
1903	4,800,000	4,000,000	5,500,000	4,000,000	([b])	([b])	40,050,000	29,005,000
1904	5,127,500	3,750,000	600,000	[c] 400,000	([d])	([d])	22,203,000	13,780,000
1905	([e])	([e])	([e])	([e])	([e])	([e])	65,010,000	63,181,000
1906 [f]	([e])	([e])	([e])	([e])	([e])	([e])	71,139,000	65,313,710
Total	19,027,500	14,050,000	10,600,000	7,900,000	1,500,000	1,000,000	209,862,000	181,579,710

Year ended June 30—	Kell Bay hatchery.		McDonald hatchery.		Total.	
	Eggs taken.	Fry liberated.	Eggs taken.	Fry planted.	Eggs taken.	Fry liberated.
1893					900,000	600,000
1894					3,000,000	2,204,000
1895					6,300,000	5,291,000
1896					6,200,000	5,475,000
1897					8,636,000	6,946,440
1898					13,877,000	9,666,000
1899					13,891,000	11,019,000
1900					19,496,900	12,707,000
1901					21,134,000	16,066,800
1902					62,260,000	53,500,000
1903	2,500,000	2,000,000			85,750,000	63,060,000
1904	([e])	([e])			65,043,500	46,630,000
1905	([e])	([e])			119,360,000	104,101,000
1906 [f]	([e])	([e])	7,000,000	5,000,000	125,572,000	111,314,750
Total	2,500,000	2,000,000	7,000,000	5,000,000	551,420,400	448,580,990

[a] Many eggs frozen.
[b] No run of fish.
[c] Hatchery was not used, the eggs being hatched out in the lake.
[d] No report.
[e] Not operated.
[f] As the take of eggs for 1905-6 had not been hatched when this report was prepared, the number of fry had to be estimated.

FERTILIZER PLANTS.

As noted elsewhere, the Alaska Oil and Guano Company has operated a herring fertilizer plant at Killisnoo for some years. During 1905 the Alaska Fish and Development Company, at Pleasant Bay, built a small fertilizer plant in an old hulk, which can be moved from place to place as desired. The company expects, when the plant is working, to utilize the salmon and herring offal from its saltery.

The Pacific Coast and Norway Packing Company also put in a small fertilizer plant in connection with its salmon cannery at Tonka in 1905. The plant cost about $3,500 and will have a capacity of 12 tons daily. The intention is to use the waste product of the cannery, and as the noxious gases which make a fertilizer plant so offensive are piped off into the furnace and there consumed it has been possible to build the plant immediately alongside the cannery building. The manager of the cannery estimates that when reduced a ton of salmon offal will make from 400 to 500 pounds of fertilizer and 150 pounds (about 20 gallons) of oil.

In 1904 the North Pacific Fish and Oil Company established a fertilizer plant at Grace Harbor, on Dall Island. It was the intention of the company to utilize the offal from a nearby salmon saltery and also such little used species as mud sharks, dogfish, etc. Unfortunately the plant proved unworkable and has not yet been remodeled to suit Alaskan conditions.

As the offal from the salmon canneries alone amounts to over 35,000,000 pounds in a season, all of which is at present thrown overboard and allowed to pollute the waters, it is easily to be seen that if small fertilizer plants could be installed at each cannery to treat this offal, as is done at the sardine canneries in Maine, this enormous annual wastage would be obviated and the waters adjacent to the canneries rendered more agreeable, not only to the denizens of the water but also to the chance visitor.

Oil.—For many years the Indians have engaged in catching the dogfish (*Squalus sucklii* Girard) and extracting from it an oil which they sell to the traders. Loring has always been a favorite resort for these fishermen, as the dogfish are especially abundant in that vicinity. It is estimated that as much as 10,000 gallons of this oil were obtained in 1892. The only firm of white men engaged in this business at present is the Ketchikan Ka-ko Oil Company, which has a small plant at Loring. The livers alone are utilized, the rest of the fish being thrown away. The oil, because of its heavy body and freedom from grit, is a most desirable lubricant and finds a ready sale in logging camps as "skid grease." In 1904 the company refined part of its product and is now endeavoring to introduce it as a medicinal oil, for which they claim it is well suited.

AQUATIC FURS.

Of the few industries followed in Alaska that of hunting the fur-bearing animals is one of the most important. Owing to the immense extent of territory still unoccupied except by a few small tribes of Indians or Eskimos, it is probable that the industry, so far as it relates to aquatic animals in the interior waters, will thrive for some years to come. Those fur-bearing animals, such as the seal and sea otter, found along the shores of the mainland and adjacent islands and the open sea, where they can easily be hunted, are rapidly becoming extinct. This fact has already had a very important bearing on the welfare of the coast tribes, as they have been dependent at many places upon their catch of these animals for the means wherewith to secure the very necessaries of life.

The fur traders have their stations located at convenient points, and from these in the spring and summer send out vessels to visit branch stations or certain rendezvous, where they secure from the natives their catch of the past year and pay for the same in goods. In the interior the traders usually fit out trusty natives with small

stocks of goods to travel among those more distant tribes which can not reach the stations. The prices paid are regulated by the standard price of red fox or marten, called 1 skin, which in 1890 was about $1.25. In 1890 a prime beaver was put in as 2 skins; black bear, 4 skins; lynx, 1 skin; land otter, 2 or 3 skins. Five yards of drilling or 1 pound of tea or 1 pound of powder, or half a pound of powder with 1 box of caps and 1 pound of shot, are given for 1 skin; 50 pounds of flour for 4 skins; 5 pounds of sugar for 1 skin. In the mining districts the prices are much higher, to conform to those paid by the miners.

Beaver.—This is the most valuable of the fur-bearing aquatic animals of the interior waters of Alaska, and since the district was acquired by the United States has been hunted with such vigor that its numbers are very much diminished and diminishing. The range of this animal covers all of the mainland of Alaska, excepting only the belt of barren-coast country bordering the Arctic Ocean from Point Hope north and east to the Canadian line. The numerous lakes and ponds and the clear streams of the interior, especially those bordered by alders and willows, are the beaver's favorite resorts. It generally avoids the large rivers, owing to the great change in level likely to occur at different seasons. The natives catch beavers in steel traps set at a frequented spot or shoot them from a concealed place near their house or dam. The natives of eastern Siberia prize the fur of the beaver very highly for trimming their fur clothing, and during the summer months many of the skins are taken across Bering Straits by the Eskimos and traded to the Siberian natives for the skins of the tame reindeer. Castoreum, an oily odorous compound secreted by the preputial glands of the animal, also the dried preputial follicles and their contents, are sometimes prepared and find a sale in China, where they occupy a place in the pharmacopœia. In 1905 but 5 pounds, valued at about $16, were prepared. From 1745 to 1867, the period covered by the Russian occupation of Alaska, 413,356 beaver skins were secured by her traders.

Muskrat.—Wherever bogs and ponds or running water occur on the mainland, except along the extreme northern coast line, this animal will be found; it is also found upon Nunevak and St. Michaels islands. It is trapped in small steel traps or in wicker fish traps. The greater part of the skins are bought by the traders for the purpose of bartering them off in other localities for more valuable furs, hence but few of them reach the outside world. They are used by the natives for making fur clothing and blankets or robes.

Land otter.—This species is one of the most widely distributed in the district, being found on the whole coast of Alaska from the southern boundary to the northern shore of Norton Sound. It also occurs on all the islands inside of these limits as far as Unimak in the west and Nunivak in the north. Within the Arctic Circle it is confined to the

upper courses of the rivers emptying into the Arctic Ocean. It is quite generally distributed over the interior of the Territory and is also found on the Kadiak Archipelago. The land otters found upon Sitkalidak, one of the Kadiak group, are famous for their very dark fur. A steel trap is generally used in capturing the animal. According to Russian records 244,538 of these skins were bought by the traders from 1745 to 1867, the date of American annexation. Since then the supply has remained fairly constant.

Sea otter.—When Bering and his party first explored the Aleutian Islands in 1760–1765 they found the sea otters exceedingly numerous all along the Aleutian chain. They are now almost unknown around a greater part of it, their principal resort at present being among the reefs and outlying islets surrounding Sannak Island, near the eastern end and on the Pacific side of the chain. The Aleutian hunters are brought to this point in vessels belonging to the trading companies and to private individuals, and landed with their bidarkas or skin canoes and hunting equipment. Here they remain for months, scouring the sea in all directions or lying upon rocky points and islets awaiting the approach of an otter within long rifle shot. The fur of this animal is the most valuable in the world. Even as far back as 1880 from $80 to $100 in cash were paid by the traders to the Aleuts for particularly fine skins. At the London sales in 1888 the average price received for these skins was £21 10s.; in 1889, £33; and in 1891, £57. A single skin, however, has sold for as high as $1,400, and in 1905 a trader at Nome valued one skin which he had secured at $2,000. During the Russian occupation (from 1745 to 1867) 260,790 sea otter skins are reported as having been shipped from Alaska.

The following table shows the number and value of the aquatic furs, other than seal, obtained in Alaska and shipped from the district from 1868 to 1905, both inclusive:

Aquatic Furs Obtained in Alaska, 1868 to 1905.[a]

Year.	Beaver.		Muskrat.		Otter, land.		Otter, sea.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
1868-1870	17,041	$85,205	17,908	$895	6,367	$31,835	12,208	$1,220,800	53,524	$1,338,735
1871-1880	41,217	206,085	50,322	2,516	27,730	138,650	40,283	4,028,300	159,552	4,375,551
1881-1890	60,940	304,700	90,000	4,500	27,730	138,650	47,842	4,784,200	226,512	5,232,050
1891-1900	21,810	109,050	30,000	1,500	21,000	105,000	6,467	646,700	79,277	862,250
1901-1904	7,740	38,700	50,396	2,520	8,556	68,448	260	39,000	66,952	148,668
1905	1,935	8,271	12,599	1,192	1,889	14,458	61	13,867	16,484	37,788
Total	150,683	752,011	251,225	13,123	93,272	497,041	107,121	10,732,867	602,301	11,995,042

[a] The values given, except in 1905, are the prices realized in London.

Fur seal.—It would be superfluous to go into any detail in regard to the general subject of the fur seal, as the existing literature devoted to this animal would constitute a large library in itself. The only breeding grounds are on the islands of St. Paul and St. George in Bering Sea. From about 1745 until the district of Alaska was annexed

to the United States in 1867 the Russians took from these islands 3,354,478 skins. In 1870 the Alaska Commercial Company secured from the Government the exclusive right to kill fur seals on the islands, and retained this right until 1890, when it was succeeded by the North American Commercial Company, which is still in possession. The decrease in the number of seals since 1867 has been enormous. It is estimated that in 1867 the herd numbered about 5,000,000, while in 1905 it was only about 200,000. A considerable part of this decrease is attributed to the killing of female seals by the pelagic sealing vessels. On their way to the breeding grounds the seals follow the coast line from Santa Barbara Channel northward and throughout this journey they are eagerly sought by the pelagic sealers. A little measure of relief to the harassed herd was extended by the decision of the Bering Sea Arbitration Tribunal in 1893, but the slaughter was soon resumed. The table below shows the catch of fur seals from 1867 to date both on the islands and from pelagic and other sources, presumably within Alaskan waters. The values given are those received in London at the great auction sales held there several times each year.

Fur-Seal Skins Obtained from the Seal Islands and from Pelagic and Other Sources, All in Waters of Alaska, 1868 to 1905.

Year.	From seal islands.		From pelagic and other sources.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.
1868	140,000	$700,000	4,367	$8,734	144,367	$708,734
1869	85,901	644,258	4,430	8,860	90,331	653,118
1870	23,773	166,411	8,686	21,715	32,459	188,126
1871	102,960	1,544,400	16,911	40,586	119,871	1,584,986
1872	108,819	1,218,774	5,336	12,806	114,155	1,231,580
1873	109,117	1,418,421	5,229	20,886	114,346	1,439,307
1874	110,585	1,448,663	5,825	49,513	116,410	1,498,176
1875	106,460	1,357,365	5,033	45,297	111,493	1,402,662
1876	94,657	828,249	5,515	28,954	100,172	857,203
1877	84,310	822,023	5,210	31,260	89,520	853,283
1878	109,323	1,071,365	5,540	38,780	114,863	1,110,145
1879	110,511	2,340,713	8,557	111,241	119,068	2,451,954
1880	105,718	2,347,687	8,418	117,852	114,136	2,465,539
1881	105,063	2,086,193	10,382	80,979	115,445	2,167,172
1882	99,812	1,357,443	15,581	79,463	115,393	1,436,906
1883	79,509	1,606,082	16,587	104,498	96,096	1,710,580
1884	105,434	1,340,096	16,971	114,554	122,405	1,454,650
1885	105,024	1,491,341	23,040	149,760	128,064	1,641,101
1886	104,521	1,788,335	28,494	199,458	133,015	1,987,793
1887	105,760	1,480,640	30,628	235,836	136,388	1,716,476
1888	103,304	2,014,370	36,389	283,834	139,693	2,298,204
1889	102,617	1,744,489	29,858	291,116	132,475	2,035,605
1890	28,859	1,053,354	40,814	620,403	69,673	1,673,757
1891	14,406	432,180	59,568	938,196	73,974	1,370,376
1892	7,509	225,270	46,642	792,914	54,151	1,018,184
1893	7,390	199,530	30,812	385,150	38,202	584,680
1894	15,033	318,176	61,838	541,083	76,871	859,259
1895	14,846	300,631	56,291	576,983	71,137	877,614
1896	30,654	521,118	43,917	351,336	74,571	872,454
1897	19,200	297,600	24,332	158,158	43,532	455,758
1898	18,047	288,752	28,552	185,588	46,599	474,340
1899	16,812	437,112	34,168	350,222	50,980	787,334
1900	22,470	719,040	35,191	563,056	57,661	1,282,096
1901	23,066	770,848	24,050	366,763	47,116	1,137,611
1902	22,182	721,175	22,812	439,131	44,994	1,160,306
1903	19,292	566,754	27,000	499,500	46,292	1,066,254
1904	12,960	388,800	11,523	232,140	24,483	620,940
1905	12,723	508,920	12,660	253,200	25,383	762,120
Total	2,488,627	38,566,578	857,157	9,329,805	3,345,784	47,896,383

At one time it was thought that the problem of furnishing a permanent supply of food for the natives on the Pribilof and Aleutian groups could be solved by salting the carcasses of the fur seals and shipping these to the various settlements. In 1880, 1,000,000 pounds, valued at $10,000, were so prepared, but owing to the fact that the meat did not keep very well, and to other causes, the project was soon abandoned. The natives living on the Pribilof group, however, still depend quite largely upon the seal carcasses for food.

MISCELLANEOUS AQUATIC ANIMALS.

Grampus.—This mammal, commonly known as the beluga in Alaska, is quite abundant in the summer along the Alaskan coast north of the Aleutian chain, being particularly numerous about the mouths of rivers and frequently ascending the larger streams far above tide water. It is migratory, and its movements are regulated by the ice. The numerous tidal creeks along the low flat coast from St. Michaels to the Kuskoquim River, in which tomcods are abundant, are the chief resort of the beluga, which comes in to feed on the fish. The Eskimos catch them with strong, large-meshed nets, heavily weighted, set off outlying points. In rough weather, when the animals can not see the nets, many are taken, but in clear weather the catch is small. Some are speared, some shot, but unless the shot goes through the spinal column these generally escape. The flesh of a young beluga is tender and not unpalatable, but is rather coarse and dry. The fat, or blubber, is clear and white and is highly valued by the natives, who extract the oil from it and use it in barter with the interior tribes. The intestines are made into waterproof garments or floats, and the sinews are very much prized. The small ivory teeth are carved into toys or ornamental pendants, while the skin is made into strong lines or very durable boot soles. The epidermis, which is nearly half an inch thick, when well cooked is considered choice eating, having a flavor somewhat resembling chestnuts.

Hair seals.—While these animals form a very insignificant part of the commerce in which the white traders participate, owing to the fact that their fur is worthless, they are of immense importance to the natives, for from the flesh and oil is secured a considerable part of their winter food, while the skins are highly prized for covering the kyacks and umiaks and for boot soles, trousers, mittens, clothing bags, and caps, and when cut into strips make a very strong and durable cord. The skin in its raw state is thick and unwieldy, but when nicely tanned becomes soft and pliable. The coast natives also barter the flesh, oil, and skins with the interior tribes for reindeer hides and furs, thus creating a very important branch of trade, of which it is impossible to form an idea, owing to the inaccessibility of

most of the tribes. The very fragmentary record kept of the skins sold to white traders shows that in 1889, 3,500 skins, valued at $7,000, in 1890, 3,444, valued at $6,888, and in 1905, 9,098 skins, valued at $5,554, were so disposed of. These meager figures are probably too low.

The species taken are the bearded seal (*Erignathus barbatus*); the ribbon seal (*Phoca fasciata*), a rare species; the ringed seal (*Phoca fœtida*), the most common; the harp seal (*Phoca grœnlandica*), quite rare; and the harbor seal (*Phoca vitulina*), which is quite common and the most widely distributed.

When the ice leaves the coast the natives hunt the seals in kyacks, using a light spear or a rifle. At this season many of the ringed seal are found upon the ice packs well offshore and are taken by the Eskimo in a curious manner. The latter wear a shirt made of white sheeting, and, paddling cautiously up to a piece of ice on which the seals are gathered, are enabled by means of the disguise to land and get among the seals without alarming them, and sometimes kill quite a number with a club before the herd takes flight. When the cold storms of September set in the seals return along shore again and seek refuge in the inner bays and sheltered coves. At this season the natives set many rawhide nets with large meshes off the rocky points, and large numbers are taken thus. Later, when the sea is frozen over, nets are set about the holes which the seals make in order to be able to come to the surface to breathe. Many of the seals also are killed at these holes by the hunters armed with spears.

Steller's sea lion.—This animal, which at one time was extremely abundant on the Pribilof Islands and along the Aleutian chain, is now almost extinct. A few still haul up on the former islands, but they are becoming less and less each year, a fact which means a serious loss to the natives, as they made more use of this animal than of any other they hunted. Its skin, flesh, intestines, bones, sinews, and oil all came into play as food or in the primitive manufactures. The skins were considered an indispensable covering for the umiak, or large canoe, used in hunting, and after the animal became practically extinct on the Aleutian chain the traders imported such skins from the coast of Lower California and Mexico for the use of their hunters. The sea lion never became other than a subject of intertribal barter.

Walrus.—This enormous mammal, which is not found south of the Bering Sea shore of the Aleutian chain, was at one time very numerous north of there, and the hunting of it and the seal formed the principal occupation of the Eskimos during the summer. It goes north as the ice breaks up in spring and returns again in the fall, stopping but a short time at any spot, and keeping close to the ice pack all this time. When in the water it is hunted by the Eskimos in kyacks, with

ivory-pointed spears and seal-skin line and floats. When the animal is exhausted by its efforts to escape the hunters draw near and give the death stroke with a lance.

According to The Friend, published at Honolulu, Hawaii, March 1, 1872, the whalers began to turn their attention to walrus-catching about the year 1868. During the first part of every season there is but little opportunity to capture whales, they being within the limits of the icy barrier. As a result, much of the whaler's time during July and August was devoted to capturing walruses. Men would be landed on the shore in June and left to watch for the animals to haul up on the beach at certain points. The walrus must either come ashore or get on the ice, and when a herd is well ashore one or two old bulls are generally left on watch. The best shot among the hunters now creeps up, and by a successful rifle shot or two kills the guard. Owing to their very defective hearing, the noise made by the rifle does not awake them. The gun is then put aside and each hunter, armed with a sharp ax, approaches the sleeping animals and cuts the spines of as many of them as possible before the others become alarmed and stampede for the water and escape.

The white hunters rarely make use of anything but the two long, curved tusks with which the animal is equipped and which average about 5 pounds to the pair. If time permits, however, the flesh is boiled and the oil saved. To many of the Eskimos, especially on the Arctic shore, the walrus is almost a necessity of life, and the devastation wrought among the herds by the whalers has been, and is yet, the cause of fearful suffering and death to many of the natives. The flesh is food for men and dogs; the oil also is used for food and for lighting and heating the houses; the skin, when tanned and oiled, makes a durable cover for the large skin boats; the intestines make waterproof clothing, window-covers, and floats; the tusks are used for lance or spear points or are carved into a great variety of useful and ornamental objects, and the bones are used to make heads for spears and for other purposes. At the present time the Kuskoquim district is the only one in which the walrus is fairly common.

In addition to hunting the walrus themselves, the whalers also purchase from the Eskimos the tusks, or ivory, that they have secured. The table on page 36 shows the quantity and value of walrus oil and ivory secured since 1868. Part of this was undoubtedly secured from the natives of Siberia, but that is more than offset by the large quantity which has been brought down by the whalers and not reported.

WALRUS IVORY AND OIL SECURED IN ALASKA, 1868 TO 1905.

Year.	Ivory.		Oil.		Year.	Ivory.		Oil.	
	Pounds.	Value.	Gallons.	Value.		Pounds.	Value.	Gallons.	Value.
1868	40,000	$2,000	173,000	$86,500	1888	5,158	$5,158	22,351	$10,505
1869	70,000	3,500	303,000	166,650	1889	6,228	4,982	26,988	13,594
1870	63,800	3,190	315,000	163,800	1890	5,799	4,639	25,129	9,549
1871	37,600	3,760	189,000	101,200	1891	5,200	3,900	20,000	9,800
1872	32,000	3,200	160,000	128,000	1892	4,800	3,360	18,196	8,006
1873	44,000	4,400	220,500	50,000	1893	7,900	6,320	21,400	9,630
1874	33,000	3,300	165,000	74,250	1894	12,313	9,850	15,100	5,534
1875	25,400	3,810	126,000	81,900	1895 [a]	....	....	....	....
1876	31,500	4,725	157,500	157,500	1896	10,000	8,000	12,444	4,604
1877	74,000	14,800	221,000	44,200	1897	41,714	31,286	8,400	3,360
1878	30,000	6,000	125,000	56,250	1898	25,700	17,990	5,111	1,845
1879	38,318	19,159	190,000	76,000	1899	22,300	16,725	6,310	2,330
1880	24,650	24,650	127,000	57,150	1900	5,969	5,969	2,200	880
1881	19,475	19,475	84,392	60,762	1901	7,000	7,000	1,200	480
1882	22,085	22,085	95,702	38,281	1902	12,491	9,993	1,800	792
1883	27,725	20,794	120,142	108,128	1903	14,100	11,985	700	280
1884	7,026	7,026	30,446	15,527	1904	8,500	6,800	1,000	400
1885	6,564	6,564	28,444	12,800	1905	11,335	8,213	....	....
1886	3,550	3,550	15,383	5,692					
1887	6,730	5,384	29,163	16,040	Total	843,930	343,542	3,064,001	1,582,219

[a] Data missing.

Whales.—Whaling at the present time is participated in to a very limited extent by the natives of Alaska, the Eskimos living along the Arctic coast being the only ones engaged. At one time, however, the natives of the Aleutian chain and the shores of Bering Sea followed whaling whenever possible during the summer months. As from the beginning, almost all of the whaling is done by the fleet which rendezvous at San Francisco. About 1867 from 10 to 12 of these whalers visited what are known as the Kadiak grounds, but this ground was soon exhausted and the whole fleet now works exclusively in the Arctic. Large numbers of humpback whales (*Megaptera versabilis*) are to be seen during the summer months in southeast Alaska, but no effort is made to capture them. The bowhead (*Balæna mysticetus*) is the common Arctic whale, and the one generally secured by the whalers, although a few right whales (*Balæna sieboldii*) are taken in certain seasons. The principal object of whale fishing at the present time is the whalebone, which brings as much as $5 per pound in the markets. As the whaling fleet generally pursues its prey in the open sea and has its headquarters outside of Alaska, its work does not come within the scope of this report except as it deals with the natives.

The belt of open water bordering the American coast from Icy Cape to the mouth of the Colville River is a favorite resort for whales during the latter part of summer and until winter sets in. From Icy Cape to Point Barrow the coast is low and sandy and backed by shallow lagoons, its southern portion being known to whalemen as the "graveyard," owing to the great number of vessels that have been wrecked there. It is along this stretch of coast that the natives do their whaling. In April the ice pack begins to loosen, and soon there

are cracks, or "leads," as they are called, open 6 or 7 miles from the shore, extending often for miles parallel to the land, but continually changing, frequently disappearing altogether as the wind veers. It is in these "leads" of open water that the whales work their way to their unknown breeding grounds in the northeast, passing by Point Barrow chiefly during the months of May and June.

Each village fits out as many boats as it can supply with crews. The crews, 8 or 10 men to the boat, or occasionally women when men are scarce, are selected during the winter. The owner, who is always the captain and steersman, sometimes hires them outright, paying them with goods, and sometimes he allows them to share in the profits; he always feeds them while the boat is in commission. The harpooner is posted in the bow, while another man, armed with a bomb gun, is located amidships. As soon as a whale is seen the boat is launched and the pursuit begun. Instead of harpooning the whale and keeping the end of the line fast in the boat, which the whale is compelled to drag about until the crew can manage to haul up and lance him to death, as is the practice of the white whalers, the Eskimos have but a short line attached to each harpoon, to the end of which are fastened two floats made of whole sealskins inflated, which are thrown overboard as soon as the harpoon is fixed in the whale. Each boat carries four or five harpoons, and as many boats as possible crowd around and endeavor to drive a harpoon into the whale each time he comes to the surface, until he can dive no longer and lies upon the water ready for the death stroke, which is given with a lance. Occasionally an opportunity occurs to use the bomb gun as soon as the whale is struck, and the contest is then ended at once. As soon as killed, the whale is towed to the edge of the solid floe and the work of cutting him up begins. The skin, blubber, and flesh, according to a custom universal among the Eskimos, belong to the whole community, no matter who killed it, but at Point Barrow the whalebone must be equally divided among all the boats that were in sight when the whale was killed. Everything is soon carried home to the village. The blubber is not tried out, but is packed away in bags made of whole sealskins, and with the meat is stowed away in little underground chambers, of which there are many in the villages.

There is very little data showing the extent of the whaling as followed by the Eskimos. In 1891 they took from 10 to 15 whales, while in 1892—a very poor season, owing to the large quantities of ice on the eastern shore at the time the whales were passing north—about 15,000 pounds of whalebone were secured. In 1905, 8,057 pounds of bone, valued at $51,197, were taken. All of the bone secured by the natives is sold to the whaling vessels, and it is very probable that large quantities so obtained in barter are reported at the home port as part of the catch of the vessel. In 1880 it is estimated that natives

put up 5,000 gallons of whale oil, valued at $500. During the period from 1883 to 1889, both inclusive, the Alaska Commercial Company shipped 33 packages of whalebone from Alaska. The weight and value of the packages are not given. In 1882, 166 barrels and in 1889, 13 barrels of whale oil were shipped from Alaska by the same company.

GENERAL STATISTICS FOR 1905.

The fisheries of Southeast Alaska in 1905 were canvassed by the writer in person; the figures for the salmon fisheries of Central and Western Alaska are compiled from the reports sent in by the canneries and salteries to the agent at the salmon fisheries of Alaska; data for the cod and other fisheries of the same sections were secured either by personal interviews or by correspondence with the owners of fishing vessels and stations, nearly all of whom are located either in California or Washington; the yield of fur seals from the Pribilof group was obtained from the report of the agent at the fur seal islands, and of the balance of the fur seals and the other aquatic furs and skins, also the whalebone, walrus ivory, etc., from the custom-house records at Juneau, Alaska. The custom-house records show the fiscal year (1904–5); all other data in the following tables represent the calendar year 1905.

In order that the data might be shown with greater clearness, the district has been divided into four geographical sections. Southeast Alaska embraces all that narrow strip of mainland and the numerous islands adjacent, from Portland Canal northwestward to, but not including, Yakutat Bay; Central Alaska embraces everything on the Pacific, or south, side from Yakutat Bay westward, including the Aleutian chain; Western Alaska the shores of Bering Sea and islands in this sea; and Arctic Alaska, from Bering Strait to the Canadian border. As these divisions are already quite generally recognized throughout the district, their use here will not be confusing.

The number of persons employed was 11,467, of which 4,028 were engaged directly in fishing and 6,856 in the canneries, salteries, and other shore work, while 583 were employed on the transporting vessels. In the salmon fishery the employees of the cannery or saltery are usually taken to the latter place aboard a sailing vessel, which remains until the season's work is ended, when she returns to the home port with the employees and the season's pack. While lying idle during the fishing season most of the crew, not being needed aboard the ship, are employed as fishermen, and have been counted as such, thus materially reducing the number of transporters.

The total investment in the fisheries was $22,038,485, of which Western Alaska furnished more than one-half. The only fishing vessels (for herring and halibut) are those in Southeast Alaska. An important feature is the large number of transporting vessels—185—with a tonnage of 67,109 and a value of $3,112,307. Nearly all of

these vessels are employed in the salmon industry. In number gill nets lead the other forms of apparatus, but are not so effective as the traps.

In variety of products secured, Southeast Alaska leads all the other divisions. This is largely owing to its greater accessibility and to the fact that its fisheries have been worked for a much longer period than the others. The halibut, herring, and trout fisheries are confined entirely to this section. The cod fishery proper is confined to Central Alaska, only a few thousand pounds being secured incidentally in Southeast Alaska. Western Alaska leads in the value of salmon canned. The only products given for Arctic Alaska are walrus skins, whalebone, walrus ivory, and a whale's head and skull, the latter being a natural-history specimen. Owing to the inaccessibility of the greater part of Western and Arctic Alaska, practically nothing is done during the winter and early spring months, but as soon as the ice breaks up in the spring the trading vessels make their rounds of the native villages and camps and collect the skins and furs which the natives have taken during the winter and ship these to Pacific coast ports. On account of this method of handling the business, the fiscal year is the better way of showing the year's catch in this section, as one whole season thus appears, and not parts of two seasons, which would be the case were the calendar year shown. It was found an impossibility to secure anything like accurate data as to the persons employed or the investment in the business of hunting aquatic animals, as it is prosecuted in conjunction with that for land animals, such as bear, marten, mink, lynx, etc., and seems to be general among the natives. Neither has anything been shown of the fishermen and investment in the Arctic region, owing to the impossibility of securing even approximate data on such matters. The natives keep no records, and besides are in many instances migratory in their habits, thus making it an impossibility to keep track of them.

The total quantity of products secured amounted to 117,247,398 pounds, valued at $7,711,981. As it was found necessary to show in full the prepared products, the figures given represent dressed and cured weights, and not that of the products as taken from the water. There is a tremendous wastage in the Alaska fisheries, especially in that for salmon, fully one-third of the round weight of the latter fish being thrown away in the process of dressing and packing. Had the round weight for all species been shown in the table the total would have been about 155,000,000 pounds. The salmon and herring fisheries of Alaska are carried on in a somewhat different manner from that followed in other parts of the country. Owing to the lack of what might be called "resident fishermen" in the district, the canneries and guano factory have to do their own fishing, and in order to accomplish this import the necessary fishermen from the Pacific coast states each season. These men are fur-

nished with fishing gear, boats, lodging, and food throughout the season, and are paid either a certain sum per thousand for each species of salmon (the price paid varying from place to place) or else straight wages. At the end of each season the men are returned to the point from whence they sailed. On account of this procedure it has been found impossible to secure even approximately correct data as to the cost of the fish as taken from the water for the salmon canneries and the one guano factory, and their products have been shown as marketed. So far as the salted salmon and herring and other species are concerned, the data given is in the same form as shown for other sections of the country in the reports of the Bureau. The tables follow.

PERSONS EMPLOYED IN THE ALASKA FISHERIES IN 1905.

How engaged.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Fishermen:				
Whites	543	658	1,470	2,671
Natives	1,147	129	72	1,348
Japanese	9			9
Total	1,699	787	1,542	4,028
Shoresmen:				
Whites	457	329	902	1,688
Natives	512	103	374	989
Chinese	375	552	1,591	2,518
Japanese	208	208	1,215	1,631
Mexicans		30		30
Total	1,552	1,222	4,082	6,856
Transporters:				
Whites	187	184	202	573
Natives	10			10
Total	197	184	202	583
Grand total	3,448	2,193	5,826	11,467

APPARATUS AND CAPITAL ENGAGED IN THE ALASKA FISHERIES IN 1905.

Items.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Fishing vessels:								
Steam and other power	8	$49,775					8	$49,775
Tonnage	209						209	
Sailing	8	5,550					8	5,550
Tonnage	81						81	
Transporting vessels:								
Steamers and launches	59	261,450	27	$276,300	45	$1,023,357	131	1,561,107
Tonnage	1,221		921		3,616		5,758	
Sailing	10	143,200	12	328,000	32	1,080,000	54	1,551,200
Tonnage	6,456		14,207		40,688		61,351	
Boats	794	100,685	317	84,555	928	237,782	2,039	423,022
Apparatus, vessel fisheries:								
Purse seines	6	5,000					6	5,000
Lines		2,494						2,494
Apparatus, shore fisheries:								
Haul seines	57	16,075	44	21,000			101	37,075
Purse seines	123	44,950	1	1,000			124	45,950
Gill nets	197	25,050	48	2,780	909	57,577	1,154	85,407
Traps	32	164,000	23	24,000	15	19,300	70	207,300
Lines		5,381		10,500				15,881
Cash capital		1,842,550		3,147,144		7,023,506		12,013,200
Shore and accessory property		1,374,978		1,756,404		2,904,142		6,035,524
Total		4,041,138		5,651,683		12,345,664		22,038,485

Products of the Alaska Fisheries in 1905.

Species.	Southeast Alaska.		Central Alaska.		Western Alaska.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Codfish:						
Fresh	3,200	$99				
Salted	3,650	136	5,492,000	$180,710		
Codfish roe, salted			2,060	82		
Codfish tongues, salted			7,975	432		
Halibut:						
Fresh	3,144,614	85,326				
Frozen	316,341	12,641				
Canned	16	1				
Salted	1,213,845	48,554				
Smoked	46,713	2,382				
Herring:						
Salted	1,880,700	10,331				
Smoked	24,435	1,534				
Herring guano	2,618,000	32,725				
Herring oil	1,074,150	35,805				
Salmon:						
Fresh, king	280,444	15,773				
Frozen—						
Coho	22,334	893				
Humpback	16,348	654				
King	21,643	866				
Canned—						
Coho	531,792	215,875	792,864	51,543	470,256	$31,542
Dog	1,807,980	102,207			205,776	10,849
Humpback	6,816,384	420,614	155,280	9,058	1,120,992	68,522
King	262,080	21,733	308,496	20,567	1,451,424	99,699
Sockeye	9,954,000	723,937	16,582,800	1,174,615	49,030,944	3,436,995
Salted—						
Coho	45,000	1,452	3,600	144		
Dog	7,122,160	106,320				
Humpback	346,600	10,654				
King	129,874	9,212			91,200	3,224
Sockeye	400	12			3,355,600	128,436
Smoked	17,013	1,155				
Salmon bellies, salted:						
Coho	7,000	210			3,800	285
Humpback	255,000	10,400				
King					2,700	190
Sockeye					3,600	270
Trout:						
Steelhead, frozen	12,306	738				
Other						
Fresh	32,000	1,569				
Frozen	100	5				
Fish oil other than herring	21,413	735				
Aquatic furs and skins:						
Beaver	799	3,952	435	1,873	701	2,446
Muskrat	18	18	598	258	961	916
Otter—						
Land	1,927	7,109	1,585	3,930	1,220	3,419
Sea			300	11,867	5	2,000
Seal—						
Fur	5,028	7,138			76,368	508,945
Hair	23,688	4,512	399	139	3,267	903
Walrus ivory	90	75	129	71		
Total	38,059,085	1,897,352	23,348,521	1,455,289	55,818,814	4,298,641

PRODUCTS OF THE ALASKA FISHERIES IN 1905—Continued.

Species.	Arctic Alaska.		Total.	
	Pounds.	Value.	Pounds.	Value.
Codfish:				
Fresh			3,200	$99
Salted			5,495,650	180,846
Codfish roe, salted			2,060	82
Codfish tongues, salted			7,975	432
Halibut:				
Fresh			3,144,614	85,326
Frozen			316,341	12,641
Canned			16	1
Salted			1,213,845	48,554
Smoked			46,713	2,382
Herring:				
Salted			1,880,700	10,331
Smoked			24,435	1,534
Herring guano			2,618,000	32,725
Herring oil			[a] 1,074,150	35,805
Salmon:				
Fresh, king			280,444	15,773
Frozen—				
Coho			22,334	893
Humpback			16,348	654
King			21,643	866
Canned—				
Coho			1,794,912	298,960
Dog			2,013,756	113,056
Humpback			8,092,656	498,194
King			2,022,000	141,999
Sockeye			75,567,744	5,335,547
Salted—				
Coho			48,600	1,596
Dog			7,122,160	106,320
Humpback			346,600	10,654
King			221,074	12,436
Sockeye			3,356,000	128,448
Smoked			17,013	1,155
Salmon bellies, salted:				
Coho			10,800	495
Humpback			255,000	10,400
King			2,700	190
Sockeye			3,600	270
Trout:				
Steelhead, frozen			12,306	738
Other—				
Fresh			32,000	1,569
Frozen			100	5
Fish oil other than herring			[b] 21,413	735
Aquatic furs and skins:				
Beaver			[c] 1,935	8,271
Muskrat			[d] 1,577	1,192
Otter—				
Land			[e] 4,732	14,458
Sea			[f] 305	13,867
Seal—				
Fur			[g] 81,396	516,083
Hair			[h] 27,354	5,554
Walrus	25	$10	[i] 25	10
Walrus ivory	11,046	7,992	11,265	8,138
Whalebone	8,057	51,197	8,057	51,197
Whale's head and skull	1,850	1,500	[j] 1,850	1,500
Total	20,978	60,699	117,247,398	7,711,981

[a] Represents 143,220 gallons.
[b] Represents 2,855 gallons.
[c] Represents 1,935 skins.
[d] Represents 12,599 skins.
[e] Represents 1,889 skins.
[f] Represents 61 skins.
[g] Represents 13,566 skins.
[h] Represents 9,098 skins.
[i] Represents 1 skin.
[j] A natural-history specimen.

The following table shows in greater detail than the preceding the number of cases (together with the size and style of cans) of each species of salmon canned, and the value of same:

OUTPUT OF SALMON FROM ALASKA CANNERIES IN 1905.

Species.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
Coho:								
½ pound, flat	516	$1,754					516	$1,754
1 pound, flat	394	1,340					394	1,340
1 pound, tall	40,169	129,696	16,518	$51,543	9,797	$31,542	66,484	212,781
Total	41,079	132,790	16,518	51,543	9,797	31,542	67,394	215,875
Dog, or chum: 1 pound, tall	37,685	102,207			4,287	10,849	41,972	113,056
Humpback: 1 pound, tall	142,008	420,614	3,235	9,058	23,354	68,522	168,597	498,194
King:								
1 pound, flat	4,248	17,585					4,248	17,585
1 pound, tall	1,212	4,148	6,427	20,567	30,238	99,699	37,877	124,414
Total	5,460	21,733	6,427	20,567	30,238	99,699	42,125	141,999
Sockeye:								
½ pound, flat	12,915	46,674					12,915	46,674
1 pound, flat	18,725	67,410					18,725	67,410
1 pound, tall	175,735	609,853	345,575	1,174,615	1,021,478	3,436,995	1,542,788	5,221,463
Total	207,375	723,937	345,575	1,174,615	1,021,478	3,436,995	1,574,428	5,335,547
Grand total	433,607	1,401,281	371,755	1,255,783	1,089,154	3,647,607	1,894,516	6,304,671

OTHER FISHERY RESOURCES OF ALASKA.

By no means are all of the fishery resources of the district utilized even yet. The lakes, streams, and coastal waters teem with the steelhead, Dolly Varden, cutthroat, rainbow, and lake trouts, but the steelhead is the only one shipped, a small quantity being frozen each season. The lake trout (*Cristivomer namaycush*) is abundant in the Yukon River, and large quantities are caught and sold fresh in the mining towns along the river. Other fresh-water species are the common pike (*Esox lucius*); the arctic grayling (*Thymallus signifer*); seven species of white-fish (*Coregonus*), nearly all of which are important articles of food to the natives living along the rivers entering Bering Sea and the Arctic Ocean, who generally catch them with gill nets set under the ice and in traps; the inconnu (*Stenodus mackenzii*), which attains a length of 5 feet and a weight of 50 pounds; smelt (*Hypomesus olidus*), which are very abundant and used as food both fresh and dried; burbot or losh (*Lota maculatus*); sucker (*Catostomus longirostris*), and the lamprey (*Ammocœtus aureus*), of which a vast quantity is captured through the ice on the Yukon River each season by the natives and frozen for future use. The eulachon, or candle-fish (*Thaleichthys pacificus*), is one of the best known of the anadromus species, but appears to be abundant in Alaskan rivers only at

infrequent periods. It has been reported at times as occurring in great abundance in the Stikine, Unuk, and Chilkat rivers, and in the rivers entering into Cook Inlet. It is much prized by the natives because of its oiliness.

In the (for Alaska) densely populated delta between the mouths of the Kuskoquim and Yukon rivers a small black-fish (*Dallia pectoralis*) is exceedingly abundant and forms the principal food of the natives during the winter months. This fish does not exceed 5 or 6 inches in length, but is very fat, and, in addition to using it whole as food, the natives try out from it a pellucid oil of which they are excessively fond.

Among the sea fishes not described elsewhere in this report and at present of commercial importance to the natives along shore or to the whites living in the vicinity of the fisheries are the following:

Atka mackerel (*Pleurogrammus monopterygius*), which are not mackerel at all, merely resembling them in flavor, are quite abundant along the southern shore of the Aleutian chain, especially around the island of Attu. They run from May to December, being most plentiful in June, July, and August, and are found in greatest abundance among the kelp in from 3 to 40 fathoms. They retire to deep water in the winter. In length the fish average about 18 inches, with an average weight of about 2⅓ pounds. They are an important article of food to the Aleutians, who also salt a few barrels annually which they sell to vessels calling at Dutch Harbor and Unalaska. The North American Commercial Company has experimented with these fish for some years and reports them as good food fish. In 1903 the Alaska Attu Mackerel Company was formed at Seattle, Wash., to engage in fishing for and curing this species, and during the same year put up 400 half barrels as an experiment. There is no record of any subsequent operations of the company. The fishery will doubtless be a very important one some day.

Black cod (*Anoplopoma fimbria*) and the cultus cod (*Ophiodon elongatus*) are very common in Southeastern Alaska and the Gulf of Alaska, and are excellent food fishes. The well-known redfish of Sitka (*Sebastodes melanops*) is one of several other species of rockfish found in Alaskan waters, and is exceedingly abundant in the Gulf of Alaska. Flounders seem to be abundant nearly everywhere. Sculpins, capelin, and lance, or lant, are exceedingly abundant along the shore and make excellent bait for the better species.

Along the shores of Norton Sound occurs the tomcod (*Microgadus proximus*), or wachna of the natives. This fish, which is very abundant in the fall and spring, is of immense importance to the natives, as they depend quite largely upon it for their winter's supply of food.

At first it is caught from boats anchored close to the shore, but when the new ice becomes strong enough to hold them the natives erect stakes with mats hung between to keep off the wind, and fish through holes cut in the ice. The fish are allowed to freeze, and in that condition are stored away in suitable receptacles until needed. They also form an important article of dog feed.

Throughout Southeastern Alaska clams are quite abundant. In 1898 and 1899 the North Pacific Trading and Packing Company packed each year several hundred cases of clams and clam juice, but then abandoned the business for some unknown reason. The clams were packed in September, usually, as they were then in the best condition. In 1903 the Alaska Packing and Navigation Company built a small cannery at Wrangell and put up about 20 cases that same year, but owing to lack of capital the cannery has not been operated since. In 1904, 42 cases were put up by the Alaska Fish and Halibut Company on Wrangell Narrows. There is an excellent opening in this line for experienced persons with a moderate amount of capital.

Along the Alaska peninsula and the Aleutian chain mussels, crabs, and shrimps are very abundant, and squid, octopus, and bêche-de-mer are quite numerous. All of these are at present utilized as food by the natives and a few of the whites, and large quantities are used as bait in the other fisheries. It is probable that when shipping facilities become better a trade in these products with Puget Sound ports can be built up. The natives also gather certain varieties of algæ and, after drying them, store them away to be eaten in winter.

FISHERIES CARRIED ON IN ALASKAN WATERS AND CREDITED TO PLACES OUTSIDE OF THE DISTRICT.

Cod.—In addition to the cod fisheries carried on from the shore stations there is a fleet of vessels which operate on the Alaskan banks, but as they hail from ports outside of Alaska they can not be credited to the district. The table below gives full data in regard to the operations of these vessels during 1905. Their methods of work, etc., have already been described in full elsewhere in this report.

COD FISHING CONDUCTED IN ALASKAN WATERS IN 1905 BY VESSELS FROM OUTSIDE PORTS.

Home port.	Vessels.				Lines.	Salted codfish.	
	Number.	Tonnage.	Value.	Crew.		Pounds.	Value.
San Francisco, Cal	6	1,382	$88,380	201	$1,260	2,800,000	$85,460
Anacortes, Wash	4	849	46,096	93	4,600	2,528,000	76,904
Seattle, Wash	4	422	31,552	70	950	948,000	28,694
Tacoma, Wash	1	195	8,512	24	1,200	240,000	7,320
Vancouver, British Columbia	1	....	8,512	24	1,200	312,000	9,516
Total	16	2,848	183,052	412	9,210	6,828,000	207,894

Halibut.—The above remarks on the codfish fleet from ports outside of Alaska apply equally well to the Puget Sound fleet operating in the waters of Southeast Alaska for halibut. Full information in regard to this fleet is given elsewhere in this report. The table below shows the number of vessels engaged in the fishery and the catch, together with all other necessary data. The catch of the sail and auxiliary power vessels in Alaskan waters has been taken from the customhouse records at Juneau, but the catch of the steamers had to be estimated, as these vessels return to their home port with their catch and lump the catch taken in Alaskan waters with that obtained outside.

HALIBUT FISHING CONDUCTED IN ALASKAN WATERS IN 1905 BY VESSELS FROM OUTSIDE PORTS.

Home port.	Steamers.			Sail and auxiliary power vessels.			Crew.	Lines.	Fresh halibut.	
	Number.	Tonnage.	Value.	Number.	Tonnage.	Value.			Pounds.	Value.
Port Townsend, Wash.	....	....	....	4	40	$2,710	16	$1,050	....	....
Seattle, Wash.	1	128	$45,600	28	503	38,340	187	13,180	....	....
Tacoma, Wash.	2	274	80,000	1	17	1,030	81	6,550	....	....
Vancouver, British Columbia	2	130	60,000	....	....	....	58	2,700	....	....
Total	5	532	185,600	33	560	42,080	342	23,480	5,367,422	$161,023

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DREDGING AND HYDROGRAPHIC RECORDS OF THE U. S. FISHERIES STEAMER ALBATROSS FOR 1904 AND 1905

Bureau of Fisheries Document No. 604

CONTENTS.

DREDGING AND HYDROGRAPHIC RECORDS OF THE U. S. FISHERIES STEAMER ALBATROSS FOR 1904 AND 1905.

INTRODUCTION AND EXPLANATION OF TABLES.

The operations of the *Albatross* in 1904 and 1905 included dredging and other collecting, also hydrographic and meteorologic observations, in three regions, (1) the southern portion of the California coast, (2) the eastern Pacific Ocean, and (3) the Pacific coast of North America between Seattle and Wrangell Island. The stations occupied during these explorations, with complete data for each, are recorded in the following tables. For the convenience of naturalists who may be interested in a particular region the three cruises are treated separately, and to facilitate tabulation the serial temperature records where taken are embodied in separate tables. The form of presentation, abbreviations, etc., are essentially the same throughout.

The various kinds of apparatus used at each station are recorded in chronological order, each on a separate line, under the station number. All stations where apparatus was employed to collect natural history material are given numbers in the "dredging" or collecting station series, and are indicated by the prefixed letter D. The hydrographic stations have another series of numbers and are designated by the letter H. At times specimens were taken with dip nets or small open tow nets during the occupation of a hydrographic station, but, on account of the irregularity of such collecting, the station was not regarded as a dredging station.

The "position" of a station is that point occupied by the vessel as determined by the navigator by means of sights, bearings, or dead reckoning at the time of beginning the first operation at that station. The position of the subsequent operations under the same station number correspond in a general way to the line as indicated under "Drift." The distance covered by all the operations of a station, however, is usually not greater than the negligible error of observation, except in stations near shore determined by bearings. In the case of those stations in which only the pump filter was operated, contrary to all other cases, the station number is applied to the position at the end of the haul.

All positions so far as possible are located by the *true* bearing *from* the ship of the nearest important or prominent shore feature; for stations too far from land to locate in this manner, only the astronomical position in degrees and minutes of latitude and longitude is given. To obviate, in locating positions, inaccuracies that may arise from the incorrectness of charts, the number and edition of the chart used is given in a separate column. In the case of stations H. 4828 to H. 4831, where the chart used is obviously inaccurate, the navigator's angles also are recorded.

"Time of day", as assigned in that column to each operation, is, in the case of a sounding, the time when the plummet struck bottom; in the case of the haul of a net or piece of collecting apparatus, it is the time when such apparatus was in place and the actual towing or dragging commenced, except in case of the pump-filter, as elsewhere explained. With surface nets, this is the time when they were in the water and began to be towed or the current to pass through them; with intermediate or bottom apparatus, when it had reached bottom, or the level at which it was to be towed or from which it was to be hoisted vertically. In reaching such position the apparatus is assumed to have sunk vertically without making any catch. The "time" of a temperature observation is the time when the thermometer was capsized.

"Depth" (in fathoms) is the depth obtained by the sounding when a sounding was made. In cases where no sounding was made the depth is estimated from the chart. The least and greatest depths are given when the operation was of long continuance.

Under "Temperatures" the minimum and maximum for the whole period occupied at the station are given. Where a single temperature is given it indicates that no change occurred during the occupation of the station.

In the double column "Trial" is indicated the depth at which apparatus was worked, as well as the duration of operation.[a] In the case of surface nets, this latter is the time towed; for intermediate nets, the time towed at the depth shown in the depth column is indicated by the first quantity, the time occupied in hoisting by the second. The duration for beam trawls is the time during which the trawl was supposed to be dragging on the bottom, up to the beginning of reeling in.

In the double column of "Drift" is shown approximately the general direction in which the gear was hauled as well as the distance.[a] The state of the currents and of the wind, with the exigencies incident to the steering of the ship, make this more or less inaccurate.

Surface nets were always towed from lower boom at a distance of about 24 feet from the ship's side, unless otherwise specified.

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[a] See footnote on p. 11 for exception in records of California cruise.

Nets set tandem were one in front or one above another, with a space of about 1 fathom between the tail of the first and the bridle of the second.

When two Kofoid nets were towed astern it is understood they were side by side, on separate lines, about 10 to 12 feet apart.

When nets were hauled vertically it is understood the haul was from the depth indicated in the "Trial" column to the surface, unless otherwise indicated.

Beam trawls were almost always rigged with wing nets at each side and mud bag at the tail.

The various forms of apparatus employed are indicated by abbreviations and the manner of their use by affixed symbols, as follows:

APPARATUS, ETC.

8′ Agassiz..........8-foot Agassiz beam trawl.

8′ Alb-Blk.........8-foot Albatross-Blake beam trawl.

[The same abbreviation with other figures indicates the other sizes of the same apparatus.]

5½′ Alb-Blk. spl ...5½-foot Albatross-Blake frame, with a net designed for manganese bottom.

10′ Blk............10-foot Blake beam trawl; similarly 5½-foot ditto.

b. d...............boat dredge.

botm..............bottom.

C. S...............Coast Survey.

Cuhn..............5-foot Cuhn net.

D.................dredging, or collecting, station.

e. l...............electric light.

H.................hydrographic station.

H. O..............hydrographic office.

int. 1.............open intermediate net 5 feet in diameter, about 11 feet long, with bobbinet, scrim and no. 12 silk lining.

int. 2.............a net of 2-inch mesh web, about 10 feet in length, hung on a 4-foot ring, with a lining of ½-inch mesh and linen.

int. 3.............a ship's net on a 5½-foot ring; net 13 feet long, of no. 000 grit gauze with about 3 feet of no. 3 silk, and a brass bucket attached at bottom. In the work of the summer of 1905, 2 Kofoid nets, on 14-inch rings and 6 feet in length, one on each side, either of no. 20 silk, K. 2, or of no. 3 silk, K. 3, were used in conjunction.

K. 1..............no. 1 Kofoid or small plankton net, made of no. 12 silk, on a 12-inch ring.

K. 2..............no. 2 Kofoid or small plankton net, with no. 20 silk on 14-inch ring.

K. 3..............a similar type, of no. 000 silk, on a 2-foot ring. See also int. 3 above.

Lt. Ho............Light-House.

Luc. sdr...........for the Lucas sounding machine.

m. b..............for mud bag.

m. c..............mud can.

pump-filter........a bag or net of no. 12 or no. 20 silk, on a 14-inch ring, and 35 inches long, supported in a metal cylinder, so that a water pressure of 4½ inches could be developed. Into this bag water was run as taken from the circulating pump and drawn from the main injection at approximately 12 feet depth. A supply sufficient to keep the net a little less than full was used, but for the reason that the pump affording this was frequently in demand for the evaporators, the operation of the filter was more or less discontinuous.

pump-filter (con.)..In labeling the collections from this apparatus, contrary to the usual custom, the station number of the position at the end of the haul was applied. This should be understood to indicate that the collection of this apparatus is continuous from the last station number for which the filter is recorded, and the collecting may thus have been continued through intervening numbers.

op. plank..........open plankton net, small silk nets of various patterns and sizes, ranging from 10 to 16 inch rings. This term includes also the Kofoid nets as elsewhere described.

Petersen int.......Cuhn-Petersen closing net.

s. d...............ship's dredge.

Sig. sdr............Sigsbee sounder.

surf...............surface.

surf. 1.............old style 4-foot ship's surface net, with no silk lining.

surf. 2.............4-foot ship's surface net, with silk lining.

surf. 3.............conical net 5 feet in diameter, about 10 feet long, ½-inch mesh web, the lower half lined with 000 silk.

surf. 4.............4-foot net, about 10 feet long, of ½-inch mesh web; about one-third of the bottom lined with 000 silk.

surf. tow..........surface tow net, same as surf. 1.

swabs.............tangle swabs.

8′ Tnr............8-foot Tanner beam trawl. Similarly other lengths of beam.

Tnr. int...........Tanner intermediate net.

Tnr. sdr...........Tanner sounder.

therm.............Negretti and Zambra thermometer, with Tanner case.

Town. int.........Townsend intermediate net.

wat. bot..........Sigsbee water bottle.

wng...............wing-nets, formerly called "butterflies."

MANNER OF USE.

* signifies depths and character of bottom taken from chart. No sounding made.

† signifies nets set tandem about 2 fathoms apart.

¶ signifies hauled vertically between depths indicated, then closed.

‡ signifies nets towed astern, from taffrail, side by side and about 10 feet apart.

‖ signifies apparatus open, hauled vertically to surface.

§ signifies apparatus *towed* (horizontally) at depth indicated by number of minutes given in first period; then *hoisted* (vertically) to surface, net *open*, in time next shown.

ȸ signifies pump in operation from station at which last emptied, and throughout occupation of intervening stations.

"Character of bottom," determined by the specimens from the sounding cup, is expressed by symbols, the key to which is appended. Where no sounding is recorded for the station the bottom character may be taken from the chart.

bk....black.	For ...Foraminifera.	M ....Mud.	S......Sand.
bl....blue.	Frag ..Fragments.	Mang..Manganese.	sft ....soft.
br....brown.	G......Gravel.	Nod...Nodules.	Sh.....Shells.
brk...broken.	Glob ..Globigerina.	Oz....Ooze.	sml....small.
C.....Clay.	gn.....green.	P.....Pebbles.	Sp.....Specks.
choc..chocolate.	gy.....gray.	Part...Particles.	St.....Stones.
Co....Coral.	hrd....hard.	Pter...Pteropods.	stky...sticky.
Corln.Coralline.	inf....infusorial.	R......Rock.	vol....volcanic.
crs...coarse.	Lav...Lava.	rad....radiolarian.	wh....white.
dk....dark.	lge....large.	rd.....red.	yl.....yellow.
fne...fine.	lt......light.	rky....rocky.	

I. EXPLORATIONS ON THE CALIFORNIA COAST.

In the interest of a comprehensive scheme for the study of the marine biology of southern California [a], undertaken by the Bureau of Fisheries in cooperation with Stanford University and the University of California, the steamer *Albatross* on March 1, 1904, began investigations in the vicinity of San Diego. The work was continued in this region until April 15, and then, after an interval, was renewed in Monterey Bay, where it was conducted from May 10 until June 15. The investigations included the occupation of 139 collecting stations and substations and 15 hydrographic stations, all in the region south of Point Conception; and 128 collecting stations in Monterey Bay—a total of 282 accepted stations.[b] In addition to these the tables show the records of 2 collecting and 1 sounding station made in September, 1904, on the Farallone Plateau, off the entrance to San Francisco.

Trials with various forms of apparatus were made for bottom material at 127 stations in the southern region, and at 129 stations in Monterey Bay, or 256 in all; only 11 stations were occupied for other collecting work. At 69 stations in the first part of the work more than one form of collecting apparatus was employed; and in the second part 58 stations were made where two or more styles of gear were used.

In accordance with recent practices of the Bureau, at nearly all collecting stations several soundings were taken to develop any changes in the depth, but only those essential to show such changes are tabulated in the records.

Losses of apparatus and accidents were not unusual, but not more than might well be expected considering the character of some of the bottom worked over, which, particularly in the vicinity of the islands off the southern coast, is extremely rugged and uneven.

In addition to investigations of purely scientific interest, the work of the vessel included the development of a number of fishing banks hitherto only locally known. A rocky shoal or ledge was located off the San Diego coast, and was named, for the fisherman acting as guide, Cabral Bank. A number of banks and ledges in Monterey Bay, all good rockfish (rock cod) grounds, were developed and charted. Off Point Santa Cruz is a small area called Rock Oyster Bank; an extensive rocky ledge, called Black Point Reef, extends entirely across the harbor of Santa Cruz; off Sauquel Point is a ledge called Sauquel Reef. About midway between Sauquel Cove and the mouth of the Pajaro River, parallel to the shore and about a mile distant, is a

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[a] See Report of the Commissioner of Fisheries for 1904, p. 107.

[b] The last previous stations occupied by the *Albatross*, D. 4302 and H. 4788, August 24, 1903, were in Southeast Alaska, where the vessel was engaged in an investigation of the condition and needs of the Alaska salmon fisheries. The tabulated records of that cruise are published in the Report of the U. S. Fish Commission for 1903, pp. 123-138.

long narrow reef called Rock Cod Ledge; and off the mouth of the Estero Grande is a small spot similarly named. In the vicinity of Point Pinos are four fishing grounds much frequented by the boats from Monterey. Seventy Fathom Bank, or Coopers Rock, lies about 3.5 miles west of the point; Italian Ledge, a smaller bank, is about the same distance north of the point; Portuguese Ledge, still smaller, lies about 3 miles north-northeast of Point Pinos; and Humpback Rock, a tiny spot, is about 2 miles east of it.

South of Point Conception the various forms of apparatus were employed as follows:

Tanner beam-trawl, 11-foot.—At 15 stations was dragged over the bottom an average of 29 minutes and a distance of 0.9 mile. At another station it was fouled almost as soon as landed on the bottom.

Tanner beam-trawl, 9-foot.—At 23 stations dragged an average of 26 minutes each, an average distance of 0.9 mile.

Tanner beam-trawl, 8-foot.—Not considering two stations where this gear was fouled within five minutes of the time it landed, it was used 54 times for an average of 25 minutes each, and dragged over the bottom an average distance of 0.7 mile.

Blake beam-trawl, 10-foot.—Hauled 11 times, an average of 24 minutes each, over an average distance of 0.9 mile.

Blake beam-trawl, 5½-foot.—Used once for 30 minutes and dragged 1.1 miles; and again for 40 minutes, 0.8 mile.

Tangle swabs, 8 on triangular frame.—Dragged 15 times, an average of 15 minutes each, an average distance of 0.6 mile.

Tangle swabs, 7 on frame.—Used once, for 13 minutes, 0.4 mile.

Tangle swabs, 3 on short bar.—Used once, 16 minutes, 1.3 miles.

Tangle swab.—A single tangle swab was seized to the tail of a trawl net at one station and dragged 2 minutes.

Ship's dredge.—Put over but once, when it was lost.

Mud bag.—Used at 49 stations; lashed to the foot of trawl net at 43, and to the crown of tangle-frame at 6; average time dragged, 24 minutes, and average distance 0.7 mile.

Townsend intermediate net.—Used vertically at 18 stations, a total of 22 hauls, from various depths.

Open plankton nets.—These were small contrivances, of various patterns and dimensions, ranging between 10 inches and 16 inches in diameter of ring at mouth, and of varying lengths. Those most often used were what was known also as a "Kofoid net," 12 inches in diameter of hoop or ring, with a bucket at the lower end, designed by Dr. C. A. Kofoid, of the University of California. These nets were used vertically in 59 hauls, from depths of 10 to 500 fathoms. They were towed at the surface at 10 stations, in 38 separate hauls, average duration of haul 10 minutes, and average distance towed 0.33 mile. At one of these stations, where 8 separate hauls of the net were made, the electric light also was towed at the surface, directly in front of the mouth of the net. At another station a Kofoid pattern net was secured in the mouth of the 4-foot surface net and towed twice with success.

Surface tow net.—This apparatus, the regulation 4-foot ringed tow net, was towed, at 58 stations, 72 times, an average of 23 minutes at each haul, and an average distance of 0.66 mile. As already noted, at one station two hauls were made with a Kofoid-pattern open-plankton net secured in the mouth of the surface net.

Dip nets.—Twice employed at night for surface collecting, the electric light being utilized at the same time to attract free-moving forms. At one station 3 nets were used from the rail for 2½ hours; at another 2 nets 1¾ hours.

Hand lines.—Used incidentally at 4 stations, an average of 7 being fished an average of 33 minutes at each trial.

Lobster pots.—Three lobster pots were set out twice over night for periods of 12 and 11 hours, respectively.

Gill nets.—Two small gill nets, such as are used for herring, were set on one occasion and left out over night for 11 hours.

Series of water densities, by means of the Sigsbee bottles, and subsurface temperatures, by the usual self-registering Negretti and Zambra thermometers, were taken at 3 stations, as follows: From 800 fathoms to 50 fathoms, 1 series; from 1,000 fathoms to surface, 2 series.

In Monterey Bay apparatus was employed as follows:

Tanner beam trawl, 16-foot.—At 10 stations was dragged an average of 20 minutes each time and a distance of 0.8 mile.

Tanner beam trawl, 11-foot.—Except one station where it fouled in less than 5 minutes, 15 hauls were made of an average duration of 27 minutes each and an average distance of 1 mile.

Tanner beam trawl, 9-foot.—Leaving out one station of less than 5 minutes, there were 8 hauls of this apparatus, averaging 27 minutes and 0.8 mile.

Tanner beam trawl, 8-foot.—Hauled at 25 stations an average of 22 minutes for a distance of 0.8 mile on the average.

Blake beam trawl, 10-foot.—Made 46 hauls, averaging 20 minutes time, and 0.6 mile over the ground.

Albatross-Blake beam trawl, 8-foot.—Used at 7 stations an average of 23 minutes each and dragged an average distance of 0.75 mile.

Tangle swabs, 8 on frame.—Hauled 8 times, an average of 13 minutes each, an average distance of 0.5 mile over the bottom.

Tangle swabs, 6 on frame.—Eight hauls, averaging 17 minutes, and 0.6 mile each.

Tangle swabs, 2 on frame.—Used with trawl nets 6 times, an average of 17 minutes each, an average distance of 0.66 mile.

Tangle swab, single.—Used with trawl nets 5 times; average time, 17 minutes; average distance dragged, 0.5 mile.

Boat dredge.—Used as an auxiliary to hauls of tangle swabs twice, an average of 14 minutes each, for 0.6 mile.

Mud bag.—Used 20 times as an auxiliary to other apparatus—7 times with the beam trawls and 13 times with tangle swabs. The average time towed was 20 minutes and average distance 0.7 mile.

Mud can.—This was an ordinary 1-gallon galvanized pail, which was seized to the tail of a trawl net for the purpose of securing a specimen of the bottom. It was used at 6 stations.

Open plankton nets.—Used vertically in 15 hauls, depths 100 to 300 fathoms. This work was all done at 5 stations, three different nets being hoisted simultaneously on the same line.

These nets were towed at the surface at 8 stations, 13 hauls being made of an average duration of 11 minutes and an average distance of 0.4 mile. One haul was inside a surface net.

Surface tow net.—Used at 11 stations, 13 hauls being made; average duration, 17 minutes; average distance towed, 0.5 mile. At one trial a Kofoid pattern open plankton net was rigged inside the surface net.

Wing nets.—These were small, conical nets, hung to light rings of varying diameters, seized to the frames of beam trawls for the capture of small forms close to the bottom. The bags of the nets were of bolting cloth or silk gauze. One was used at 2 stations and 2 were used at 17 stations.

The depth of a bottom haul is indicated in these tables by the several soundings necessary to show the range in depth. When but a single sounding is given it may be assumed that the depth was regular. Where a depth is "estimated" the angle and scope of the dredging cable is used for this determination.

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.		1904.		*fms.*	
D. 4303	Point Loma Lt. Ho., N. 12° W., 6.1 miles.	C. S. 5100	Mar. 1	3.53 p. m.	21	gy. S.
				4.00 p. m.	21-24	gy. S., Co., G.
				4.27 p. m.	24	G.
D. 4304	Point Loma Lt. Ho., N. 2° W., 5.9 miles.	do	Mar. 1	4.43 p. m.	25	crs. yl. S.
				4.51 p. m.	25	crs. yl. S., Sh., G.
				5.13 p. m.	25	crs. yl. S., Sh., G.
D. 4305	Point Loma Lt. Ho., N. 39° E., 9.6 miles.	do	Mar. 2	8.36 a. m.	67	gy. S., Sh.
				9.01 a. m.	67-116	gy. S., Sh.
				9.30 a. m.	116	fne. gy. S.
D. 4306	Point Loma Lt. Ho., N. 32° E., 10.3 miles.	do	Mar. 2	10.35 a. m.	207	gn. M., fne. S.
				11.00 a. m.	207-497	gn. M., fne. S., G.
				11.04 a. m.	207-497	gn. M., fne. S., G.
				11.07 a. m.	346	gn. M., fne. S., G.
				11.40 a. m.	497	gn. M., fne. S., G.
				11.45 a. m.	497	gn. M., fne. S., G.
D. 4307	Point Loma Lt. Ho., N. 32° E., 10.6 miles.	do	Mar. 2	2.31 p. m.	169	fne. S.
				3.05 p. m.	169-490	fne. S.
				3.12 p. m.	490	gn. M., fne. S.
				3.22 p. m.	490-496	gn. M., fne. S.
				3.58 p. m.	496	gn. M., fne. S.
				4.14 p. m.	496	gn. M., fne. S.
D.4308a	At anchor, San Diego entrance, Point Loma Lt. Ho., S. 34° W., 1 mile.	C. S. 5106	Mar. 3	9.00 a. m.	8	gy. S. (hard)
				9.10 a. m.	8	gy. S. (hard)
				9.15 a. m.	8	gy. S. (hard)
				9.40 a. m.	8	gy. S. (hard)
				9.40 a. m.	8	gy. S. (hard)
				9.46 to 10.27 a. m.	8	gy. S. (hard)
D.4308b (H4789)	Point Loma Lt. Ho., N. 42° E., 9.5 miles.	C. S. 5100	Mar. 3	1.03 p. m.	71	fne. S., Sh.
				1.05 p. m.	71	fne. S., Sh.
D. 4309	Point Loma Lt. Ho., N. 41° E., 8.6 miles.	do	Mar. 3	1.27 p. m.	67	fne. S., Sh.
				1.44 p. m.	67-73	fne. S., Sh., R.
				1.53 p. m.	67-78	fne. S., Sh., R.
				2.05 p. m.	73	fne. S., R.
				2.19 p. m.	78	fne. S., R.
				2.23 p. m.	78	fne. S., R.
D. 4310	Point Loma Lt. Ho., N. 46° E., 8.1 miles.	do	Mar. 3	2.54 p. m.	71	fne. gy. S.
				3.03 p. m.	71-75	gn. M., fne. S.
				3.16 p. m.	71-75	gn. M., fne. S.
				3.28 p. m.	75	gn. M., fne. S.
				3.30 p. m.	75	gn. M., fne. S.
H. 4790	Point Loma Lt. Ho., N. 43° E., 8.5 miles.	do	Mar. 4	8.36 a. m.	69	fne. gn. S.
D. 4311	Point Loma Lt. Ho., N. 52° E., 7.2 miles.	do	Mar. 4	9.25 a. m.	110	gn. M.
				9.27 a. m.	110	gn. M.
				9.38 a. m.	110-129	gn. M., fne. S.
				9.44 a. m.	129-143	gn. M., fne. S., R.
				9.47 a. m.	129	gn. M., fne. S.
				10.54 a. m.	143	gn. M., fne. S.
D. 4312	Point Loma Lt. Ho., N. 56° E., 7.9 miles.	do	Mar. 4	11.03 a. m.	135	fne. gy. S., R.
				11.15 a. m.	135-95	fne. gy. S., R.
				11.18 a. m.	135-95	fne. gy. S., R.
				11.40 a. m.	95	fne. gy. S., R.

INVESTIGATIONS OF THE ALBATROSS, 1904.

Temperature.			Apparatus.	Trial.[a]		Drift.[a]		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
64	63		Tnr. sdr		0 36	S.	1.0	
64	63		11′ Tnr.	Bottom.	25	S.	.9	
64	62		Tnr. sdr			None		
64	61	52.0	Tnr. sdr		31	N. 38° E.	1.1	
63	60	52.0	11′ Tnr.; m. b.	Bottom.	19	N. 38° E.	.9	
63	60	52.0	Tnr. sdr			None		
60	59	49.9	Tnr. sdr		58	N. 51° W.	1.3	
65	59		11′ Tnr.	Bottom.	25	N. 51° W.	.9	
67	59	48.0	Tnr. sdr			None		
70	59		Tnr. sdr		1 35	S. 40° W.	1.7	
70	59		Surf. tow	Surface.	43	S. 40° W.	1.0	
70	59		11′ Tnr.; m. b.	Bottom.	35	S. 40° W.	.8	Mud bag, fast to tail of trawl net came up afoul of mouth of net.
70	59		Tnr. sdr			None		Hauled obliquely on a scope of 100 fms. cable from a depth estimated at 75 fms.
69	59	40.2	Op. plank	75 fms.	19	None		
69	59	40.2	Tnr. sdr			None		
69	60		Tnr. sdr		1 50	S. 50° W.	1.8	
67	61		Surf. tow	Surface.	35	S. 50° W.	1.0	
67	61		Sig. sdr			None		
66	61		11′ Tnr.; m. b.	Bottom.	34	S. 50° W.	1.0	
66	61	40.3	Tnr. sdr			None		
66	61	40.3	Op. plank ‖	100 fms.	10	None		
54	57		Hand lead		2 0	Tide-current.	4.0	Seining party ashore.
55	57		Surf. tow	Surface.	23	Tide-current.	.7	Towed in usual manner as current swept past.
55	57		Op. plank	3 fms.	7	Tide-current.	.2	Hauled through water from depth of about 3 fms. to surface; tide too strong to get net to bottom.
56	57		Op. plank	3 fms.	4	Tide-current.	.1	
56	58		Surf. tow	Surface.	21	Tide-current.	.6	
57	58		Op. plank	3–8 fms.	7	None		7 hauls of open plankton nets, made at intervals of about 5 minutes at depths between 3 and 8 fms. and surface in average time of 1 minute. Tide slacking. From 9 to 10 a. m. ebb tide running about 3 miles per hour, slacking after 10 to about 1 mile at 11 a. m. Work interfered with by eel grass and kelp carried down by tide.
62	61		Tnr. sdr		9	None		
62	61		Op. plank ‖	100 fms.	7	None		
62	61		Tnr. sdr		1 0	S. 73° W.	1.0	
63	61		11′ Tnr.; m. b.	Bottom.	36	S. 73° W.	.8	
65	61		Surf. tow	Surface.	28	S. 73° W.	.6	
67	61		Tnr. sdr			None		
67	61		Op. plank ‖	50 fms.	8	None		
67	61		Tnr. sdr			None		
66	61	49.7	Sig. sdr		32	S. 88° W.	.9	
66	61		11′ Tnr.; m. b.	Bottom.	23	S. 88° W.	.7	
66	61		Surf. tow	Surface.	11	S. 88° W.	.3	
66	61		Op. plank ‖	50 fms.	8	None		
66	61		Tnr. sdr			None		
57	59		Tnr. sdr		3	None		
62	59	48.0	Tnr. sdr		1 30	S. 76° W.	.4	
62	59	48.0	Op. plank	(?)	2	None		No record of depth of haul; believed to be from 50 fms.
63	59		Surf. tow	Surface.	27	S. 76° W.	.3	
64	59		11′ Tnr.; m. b.	Bottom.	50	S. 76° W.	.4	Trawl frame and net wrecked; mud bag lost.
64	60		Tnr. sdr			None		
70	60		Tnr. sdr			None		
70	60		Tnr. sdr		47	N. 76° W.	.9	
70	60		8′ Tnr.; m. b.	Bottom.	25	N. 76° W.	.6	Mud bag wrecked.
70	60		Surf. tow	Surface.	22	N. 76° W.	.5	
70	60		Tnr. sdr			None		

[a] In the records of this cruise the entire time occupied in all the operations of any given station and the general direction and total distance of drift are shown in the respective columns opposite the initial operation at that station, which was usually a sounding.

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.—Continued.		1904.		*fms.*	
D. 4313	Point Loma Lt. Ho., N. 57° E., 9.5 miles.	C. S. 5100	Mar. 4	1.07 p. m.	92	gy. S., Sh
				1.07 p. m.	92	gy. S., Sh
				1.22 p. m.	92–243	gy. S., Sh
				1.27 p. m.	92–243	gy. S., Sh., R
				1.54 p. m.	243	gy. S., Sh., R
D. 4314	Point Loma Lt. Ho., N. 34° E., 9.8 miles.	do	Mar. 4	2.47 p. m.	64	lt. gy. S., bk. Sp., Sh., G.
				2.47 p. m.	64	lt. gy. S., bk. Sp., Sh., G.
				2.57 p. m.	64–248	br. M., fne. S., G
				3.01 p. m.	72	gy. S., G
				3.04 p. m.	72–492	br. M., fne. S., R
				3.20 p. m.	248	br. M., fne. S
				3.51 p. m.	492	gn. M
D. 4315	Point Loma Lt. Ho., N. 42° E., 9.1 miles.	do	Mar. 5	8.35 a. m.	68	fne. gy. S
				8.38 a. m.	68	fne. gy. S
D. 4316	Point Loma Lt. Ho., N. 35° E., 10.4 miles.	do	Mar. 5	8.56 a. m.	75	fne. gy. S
				8.59 a. m.	75	fne. gy. S
D. 4317	Point Loma Lt. Ho., N. 36° E., 11 miles.	do	Mar. 5	9.14 a. m.	161	fne. gy. S
				9.14 a. m.	161	fne. gy. S
				9.33 a. m.	161–510	gn. M., fne. S
				9.45 a. m.	492	gn. M., fne. S
				10 a. m.	471–510	gn. M., fne. S
				10.01 a. m.	471	gn. M
				10.34 a. m.	510	gn. M.,
				10.40 a. m.	510	gn. M
D. 4318	Soledad Hill, Point La Jolla, S. 70° E., 4.6 miles.	do	Mar. 7	10.13 a. m.	114	(No specimen)
				10.13 a. m.	114	(No specimen)
D. 4319	Soledad Hill, Point La Jolla, S. 70° E., 3.8 miles.	do	Mar. 7	10.44 a. m.	55	gn. M
				10.45 a. m.	55	gn. M
D. 4320	Soledad Hill, Point La Jolla, S. 43° E., 2.9 miles.	do	Mar. 7	11.11 a. m.	55	gn. M
				11.11 a. m.	55	gn. M
D. 4321[a]	Soledad Hill, Point La Jolla, S. 43° E., 3.1 miles.	do	Mar. 7	11.27 a. m.	206	dk. gn. M
				11.28 a. m.	206	dk. gn. M
D. 4322	Soledad Hill, Point La Jolla, S. 34° E., 3.2 miles.	do	Mar. 7	1.19 p. m.	110	gn. M., Sh
				1.33 p. m.	110	gn. M., Sh
				1.35 p. m.	110	gn. M., Sh
				1.35 p. m.	110–199	sft. gn. M
				1.38 p. m.	110–199	sft. gn. M
				2.08 p. m.	199	sft. gn. M
				2.10 p. m.	199	sft. gn. M
D. 4323	Soledad Hill, Point La Jolla, S. E., 3.7 miles.	do	Mar. 7	2.40 p. m.	227	sft. gn. M
				2.46 p. m.	227	sft. gn. M
				2.52 p. m.	227–193	sft. gn. M
				3.22 p. m.	193	sft. gn. M
D. 4324	At anchor off Pacific Beach, Soledad Hill, Point La Jolla, N. 24° E., 3.1 miles.	do	Mar. 7	5.30 p. m.	10	gy. S
				5.30 p. m.	10	gy. S
				6.30 p. m.	10	gy. S
				6.35 p. m.	10	gy. S
				7.35 p. m.	10	gy. S
D. 4325	Soledad Hill, Point La Jolla, S. E., 4.4 miles.	do	Mar. 8	8.44 a. m.	191	gn. M., fne. S
				8.45 a. m.	191	gn. M., fne. S
				8.54 a. m.	191–292	gn. M., fne. S
				9.11 a. m.	275	gn. M., fne. S
				9.17 a. m.	275–292	gn. M., fne. S
				9.43 a. m.	292	gn. M
				9.48 a. m.	292	gn. M
D. 4326[b]	Soledad Hill, Point La Jolla, S. 50° E., 5.6 miles.	do	Mar. 8	10.06 a. m.	280	(No sounding)
				10.09 a. m.	280–243	
				10.23 a. m.	264–243	sft. gn. M
				10.25 a. m.	264	sft. gn. M
				10.37 a. m.	243	sft. gn. M
				10.45 a. m.	243	sft. gn. M

[a] Between stations D. 4321 and D. 4322 temperatures taken as follows: 55 fms., 49°; 100 fms., 48°; 203 fms., 45°.

[b] Between stations D. 4325 and D. 4326 temperatures taken as follows: 50 fms., 51°; 100 fms., 48°.

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
64	61		Tnr. sdr		54	S. 77° W	.8	
64	61		Op. plank	(?)	7	None		No record of depth of haul; believed to be from 50 fms. Ring broken.
64	61		Surf. tow	Surface	28	S. 77° W	.7	
64	61		8′ Tnr.; m. b	Bottom	21	S. 77° W	.5	
64	61	44.1	Tnr. sdr			None		
61	60		Sig. sdr		1 13	S. 32° W	1.9	
61	60		Op. plank ‖	50 fms	2	None		
60	60		Surf. tow	Surface	31	S. 32° W	1.2	
60	60		Sig. sdr			None		
60	60		11′ Tnr.; s. d.	Bottom	39	S. 32° W	1.5	Lost trawl frame and complete ship's dredge; trawl net wrecked.
60	60		Sig. sdr			None		Temperature at 75 fms., 49°.
61	61	40.2	Sig. sdr			None		
64	60	49.0	Tnr. sdr		5	None		
64	60	49.0	Op. plank ‖	50 fms	2	None		
64	60	49.0	Sig. sdr		5	None		
64	60	49.0	Op. plank	70 fms	2	None		Hauled obliquely on a scope of 100 fms. cable from a depth estimated at 70 fms.
64	60	47.0	Sig. sdr		1 53	S. 6° W	2.3	
64	60	47.0	Op. plank ‖	50 fms	1	None		
62	60		Surf. tow	Surface	1 1	S. 6° W	2.0	Temperature at 70 fms., 49.5°.
60	60		Sig. sdr			None		
60	60		9′ Tnr.; m. b	Bottom	30	S. 6° W	2.0	
60	60		Sig. sdr			None		
60	60	40.0	Op. plank ‖	100 fms	5	None		
60	60	40.0	Sig. sdr			None		
71	61		Tnr. sdr		6	None		Lost sounding lead.
71	61		Op. plank ‖	100 fms	4	None		
69	61	50.5	Sig. sdr		7	None		
69	61	50.5	Op. plank ‖	50 fms	5	None		
67	61		Sig. sdr		3	None		
67	61		Op. plank ‖	50 fms	2	None		
70	61	58.0	Sig. sdr		6	None		Temperature at 55 fms., 49.5°.
70	61	58.0	Op. plank ‖	100 fms	4	None		
74	61		Op. plank ‖	100 fms	3	None		
73	62		Sig. sdr		40	NW	.5	
73	62		Op. plank ‖	100 fms	4	None		
73	62		9′ Tnr.; m. b.	Bottom	29	NW	.4	
73	62		Surf. tow	Surface	30	NW	.4	
72	63	45.4	Sig. sdr			None		
72	63	45.4	Op. plank ‖	150 fms	5	None		
72	63		Sig. sdr		56	N. 22° W	.7	
72	63		Surf. tow	Surface	31	N. 22° W	.5	
72	63		11′ Tnr.; m. b.	Bottom	25	N. 22° W	.4	
73	63	45.8	Sig. sdr			None		
69	63		Hand lead		13 0	None		Night anchorage.
69	63		8 hand lines	Bottom	1 0	None		Fished from ship's rail.
62–58	64–60		3 lobster pots	Bottom	12 0	None		Set in edge of kelp patch near anchorage.
62–61	64–62		3 dip nets & e. l.	Surface	2 30	None		
62	64		Op. plank ‖ & e. l	10 fms	1	None		
65	62	46.0	Sig. sdr		1 11	N. 69° W	1.3	
65	62	46.0	Op. plank ‖	150 fms	3	None		
65	62		Surf. tow	Surface	44	N. 69° W	1.1	
65	62		Sig. sdr			None		
65	62		9′ Tnr.; m. b.	Bottom	30	N. 69° W	.7	
66	62	43.0	Sig. sdr			None		
66	62	43.0	Op. plank ‖	150 fms	7	None		
67	62				56	W	.6	Depth estimated.
67	62		Surf. tow	Surface	28	W	.4	
68	62		9′ Tnr.; m. b.	Bottom	14	W	.2	Net wrecked from weight of mud.
68	62		Sig. sdr			None		
69	62	44.0	Op. plank ‖	150 fms	7	None		
70	62	44.0	Sig. sdr			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.—Continued.		1904.		*fms.*	
D. 4327	Soledad Hill, Point La Jolla, S. 54° E., 6.3 miles.	C. S. 5100	Mar. 8	11.16 a. m.	263	sft. gn. M
				11.20 a. m.	263	sft. gn. M
				11.22 a. m.	263–330	sft. gn. M
				11.30 a. m.	263–330	sft. gn. M
				11.38 a. m.	299	sft. gn. M
				11.55 a. m.	330	sft. gn. M
				11.57 a. m.	330	sft. gn. M
D. 4328	Soledad Hill, Point La Jolla, S. 40° E., 1.4 miles.	do	Mar. 8	2.16 p. m.	71	fne. gy. S
				2.21 p. m.	71–57	gn. M., fne. S., R.
				2.26 p. m.	57	gn. M
D. 4329	Soledad Hill, Point La Jolla, S. 38° 30′ E., 1.9 miles.	do	Mar. 8	2.43 p. m.	128	gn. M., fne. S
				2.50 p. m.	128–112	gn. M., fne. S
				2.50 p. m.	128–112	gn. M., fne. S
				2.53 p. m.	112	gn. M., fne. S
				3.30 p. m.	112	gn. M., fne. S
D. 4330	Point Loma Lt. Ho., N. 18° E., 10.8 miles.	do	Mar. 9	8.30 a. m.	55	lt. gn. S
				8.38 a. m.	55–57	lt. gn. S., R
				8.39 a. m.	57	lt. gn. S
D. 4331	Point Loma Lt. Ho., N. 22° 30′ E., 11 miles.	do	Mar. 9	9.11 a. m.	57	lt. gn. S., R
				9.14 a. m.	57–58	lt. gn. S., R
				9.27 a. m.	58	gy. S., bk. Sp
D. 4332	Point Loma Lt. Ho., N. 25° E., 11.3 miles.	do	Mar. 9	9.40 a. m.	62	gy. S., bk. Sp., R.
				9.42 a. m.	62–183	gy. S., bk. Sp., R.
				10.09 a. m.	183	gy. S., bk. Sp., R.
D. 4333[a]	Point Loma Lt. Ho., N. 27° E., 12.2 miles.	do	Mar. 9	10.25 a. m.	301	gn. M
				10.27 a. m.	301	gn. M
				10.38 a. m.	301–487	gn. M
				10.45 a. m.	412	gn. M
				11.14 a. m.	487	gn. M
D. 4334	Point Loma Lt. Ho., N. 33° 30′ E., 13.6 miles.	do	Mar. 9	1.09 p. m.	525	gn. M
				1.36 p. m.	525–541–514	gn. M., fne. S
				1.44 p. m.	541	gn. M., fne. S
				2.04 p. m.	514	gn. M., fne. S
				2.08 p. m.	514	gn. M., fne. S
D. 4335	Point Loma Lt. Ho., N. 36° E., 14.1 miles.	do	Mar. 9	2.46 p. m.	500	gn. M., fne. S
				3.06 p. m.	500–530–524	gn. M., fne. S
				3.20 p. m.	530	gn. M., fne. S
				3.36 p. m.	524	gn. M., fne. S
				3.44 p. m.	524	gn. M., fne. S
D. 4336	Point Loma Lt. Ho., N. 38° 30′ E., 14.8 miles.	do	Mar. 10	9.23 a. m.	518	gn. M
				9.43 a. m.	518–565	gn. M
				9.51 a. m.	518–565	gn. M
				10.21 a. m.	565	gn. M
				10.25 a. m.	565	gn. M
D. 4337	Point Loma Lt. Ho., N. 38° 30′ E., 15.6 miles.	do	Mar. 10	11.12 a. m.	617	gn. M
				11.15 a. m.	617–680	gn. M
				11.22 a. m.	617–680	gn. M
				11.43 a. m.	680	gn. M
				12 m.	679	gn. M
				12.02 p. m.	679	gn. M
D. 4338	Point Loma Lt. Ho., N. 33° E., 10.5 miles.	do	Mar. 10	2.22 p. m.	168	fne. gy. S
				2.33 p. m.	168–254	gn. M., fne. S., R
				2.28 p. m.	168–254	gn. M., fne. S., R
				2.40 p. m.	254	gn. M
				2.49 p. m.	254	gn. M
D. 4339	Point Loma Lt. Ho., N. 36° E., 11.2 miles.	do	Mar. 10	3.07 p. m.	241	gn. M
				3.08 p. m.	241–369	gn. M
				3.17 p. m.	287–369	gn. M
				3.21 p. m.	287	gn. M
				3.50 p. m.	369	gn. M
				3.55 p. m.	369	gn. M
D. 4340	S. point South Coronado Island, N. 87° E., 1.8 miles.	do	Mar. 11	9.38 a. m.	46	fne. gy. S., bk. Sp., G.
				9.46 a. m.	46–87	fne. gy. S., bk. Sp., G.
				10.07 a. m.	87	gy. S., bk. Sp
				10.09 a. m.	87	gy. S., bk. Sp

[a] Between stations D. 4333 and D. 4334 temperatures taken as follows: 100 fms., 48.8°; 200 fms., 45.5°.

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m		mi.	
72	62	......	Sig. sdr	....	56	N. 56° W..	1.1	
72	62	......	Op. plank ‖	150 fms..	4	None	....	
72	62	......	Surf. tow	Surface.	33	N. 56° W..	.8	
73	62	......	8′ Tnr	Bottom.	24	N. 56° W..	.6	
74	62	......	Sig. sdr	....	....	None	....	
76	62	43.5	Op. plank ‖	100 fms..	8	None	....	
76	62	43.5	Sig. sdr	....	....	None	....	
66	62	......	Tnr. sdr	....	16	S. 15° W..	.2	
66	62	......	8′ Tnr.; 1 swab.	Bottom.	2	S. 15° W..	.1	Frame lost; net wrecked.
66	62	49.5	Tnr. sdr	....	....	None	....	
67	62	......	Tnr. sdr	....	50	N. 48° W..	.3	
67	62	......	8′ Tnr	Bottom.	6	N. 48° W..	.2	Net wrecked.
67	62	......	Surf. tow	Surface.	9	N. 48° W..	.3	
67	62	......	Sig. sdr	....	....	None	....	
68	62	......	Op. plank ‖	25 fms...	2	None	....	
60	58	......	Tnr. sdr	....	26	N. 88° W..	.4	
60	58	......	8′ Tnr	Bottom.	5	N. 88° W..	.2	Net badly torn.
60	58	......	Tnr. sdr	....	....	None	....	
65	59	......	Tnr. sdr	....	22	S. 84° W..	.6	
65	59	......	9′ Tnr	Bottom.	15	S. 84° W..	.5	Frame bent; net wrecked.
66	59	50.5	Tnr. sdr	....	....	None	....	
67	59	......	Tnr. sdr	....	33	S. 51° W..	1.0	
67	59	......	8 swabs; m. b.	Bottom.	25	S. 51° W..	.9	
69	59	......	Tnr. sdr	....	....	None	....	
69	59	......	Sig. sdr	....	59	N. 84° W..	1.6	
69	59	......	Op. plank ‖	150 fms..	13	None	....	
69	59	......	8′ Tnr	Bottom.	30	N. 84° W..	1.0	
70	59	41.7	Sig. sdr	....	....	None	....	
71	60	40.1	Sig. sdr	....	....	None	....	
65	60	......	Sig. sdr	....	1 28	S. 83° W..	.8	
65	60	......	8′ Tnr	Bottom.	28	S. 83° W..	.4	
65	60	......	Sig. sdr	....	....	None	....	
66	60	40.0	Op. plank ‖	150 fms.	13	None	....	
66	60	40.0	Sig. sdr	....	....	....	....	
65	61	......	Sig. sdr	....	1 25	S. 83° W..	1.0	
64	61	......	8′ Tnr	Bottom.	30	S. 83° W..	.6	
64	61	......	Sig. sdr	....	....	None	....	
64	61	39.5	Town. int. ¶	50 to 25 fms.	4	None	....	
64	61	39.5	Sig. sdr	....	....	None	....	
58	58	......	Sig. sdr	....	1 23	S. 39° W..	1.4	
59	58	......	Surf. tow	Surface.	26	S. 39° W..	.8	
59	59	......	8′ Tnr	Bottom.	27	S. 39° W..	.8	
60	59	39.0	Town. int. ¶	150 to 100 fms.	5	None	....	
60	59	39.0	Sig. sdr	....	....	None	....	
61	59	......	Sig. sdr	....	1 8	S. 75° W..	1.5	
61	59	......	Surf. tow	Surface.	44	S. 75° W..	1.3	
61	59	......	8′ Tnr.; m. b	Bottom.	25	S. 75° W..	.7	
61	59	......	Sig. sdr	....	....	None	....	
60	59	38.5	Town. int. ¶	150 to 100 fms.	5	None	....	
60	59	38.5	Sig. sdr	....	....	None	....	
60	60	......	Sig. sdr	....	42	S. 73° W..	.9	
60	60	......	8′ Tnr.; m. b	Bottom.	12	S. 73° W..	.4	Net torn; mud bag damaged.
60	60	......	Surf. tow	Surface.	12	S. 73° W..	.4	
60	59	44.0	Sig. sdr	....	....	None	....	
60	59	44.0	Town. int. ¶	125 to 50 fms.	7	None	....	
59	59	......	Sig. sdr	....	1 7	N. 65° W.	1.1	
59	59	......	Surf. tow	Surface.	40	N. 65° W.	.9	
59	59	......	8′ Tnr.; m. b	Bottom.	29	N. 65° W.	.7	
59	59	......	Sig. sdr	....	....	None	....	
59	59	41.5	Town. int. ¶	150 to 50 fms.	5	None	....	
59	59	41.5	Sig. sdr	....	....	None	....	
56	59	......	Tnr. sdr	....	44	S. 71° W..	1.6	
56	59	......	8′ Tnr.; m. b	Bottom.	29	S. 71° W..	1.2	
57	59	......	Op. plank ‖	50 fms..	9	None	....	
57	59	......	Tnr. sdr	....	....	None	....	

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.—Continued.					
			1904.		*fms.*	
D. 4341	S. point South Coronado Island, N. 79° E., 3.3 miles.	C. S. 5100	Mar. 11	10.22 a. m.	188	gy. S., bk. Sp.
				10.43 a. m.	266–323	gy. S., bk. Sp.
				10.43 a. m.	266–323	gy. S., bk. Sp.
				10.44 a. m.	266	gy. S., bk. Sp.
				11.05 a. m.	323	gy. S., bk. Sp.
D. 4342	S. point South Coronado Island, S. 72° E., 2.6 miles.	do	Mar. 11	11.58 a. m.	53	gy. S.
				12.03 p. m.	53–66	gy. S.
				12.23 p. m.	66	gy. S., bk. Sp.
D. 4343	S. point South Coronado Island, S. 60° E., 3.6 miles.	do	Mar. 11	1.34 p. m.	55	fne. gy. S.
				1.40 p. m.	55–155	fne. gy. S.
				1.48 p. m.	60	fne. gy. S.
				1.51 p. m.	60–155	fne. gy. S.
				2.06 p. m.	61	fne. gy. S.
				2.14 p. m.	155	fne. gy. S.
				2.15 p. m.	155	fne. gy. S.
D. 4344	S. point South Coronado Island, S. 68° E., 5.3 miles.	do	Mar. 11	2.30 p. m.	224	(No specimen)
				2.30 p. m.	224	(No specimen)
				2.41 p. m.	224	Rky.
D. 4345	Point Loma Lt. Ho., N. 1° E., 12.4 miles.	do	Mar. 11	4.13 p. m.	25	gy. S.
				4.18 p. m.	25–25	gy. S.
				4.30 p. m.	25	gy. S.
D. 4346	Point Loma Lt. Ho., N. 35° E., 4.2 miles.	do	Mar. 12	8.02 a. m.	46	dk. gn. M., fne. S.
				8.07 a. m.	46–50	dk. gn. M., fne. S.
				8.33 a. m.	50	fne. gy. S.
D. 4347	Point Loma Lt. Ho., N. 43° E., 5.2 miles.	do	Mar. 12	8.45 a. m.	55	fne. gy. S.
				8.47 a. m.	55–58	fne. gy. S.
				8.52 a. m.	55–58	fne. gy. S.
				9.16 a. m.	58	fne. gy. S., bk. Sp.
D. 4348	Point Loma Lt. Ho., N. 49° E., 5.8 miles.	do	Mar. 12	9.33 a. m.	83	gy. M., fne. S., bk. Sp.
				9.39 a. m.	83–113	gy. M., fne. S., bk. Sp.
				9.42 a. m.	96	gy. M., fne. S., bk. Sp.
				9.44 a. m.	96–113	gy. M., fne. S., bk. Sp.
				10.14 a. m.	113	gy. M., fne. S., bk. Sp.
D. 4349	Point Loma Lt. Ho., N. E., 6.5 miles.	do	Mar. 12	10.34 a. m.	75	gn. M., fne. S.
				10.37 a. m.	75–134–81	gn. M., fne. S.
				10.39 a. m.	82	gn. M., fne. S.
				10.39 a. m.	82–134–81	gn. M., fne. S.
				11.11 a. m.	134	gn. M., fne. S.
				11.26 a. m.	81	gn. M., fne. S.
D. 4350	Point Loma Lt. Ho., N. 51° E., 8.2 miles.	do	Mar. 12	11.38 a. m.	81	crs. gy. S.
				11.43 a. m.	81–84	gn. M., crs. S., Sh., G.
				11.45 a. m.	81–84	gn. M., crs. S., Sh., G.
				12.11 p. m.	84	gn. M., crs. S., Sh., G.
D. 4351	Point Loma Lt. Ho., N. 36° E., 12.3 miles.	do	Mar. 14	9.36 a. m.	423	sft. gn. M.
				9.44 a. m.	423–488	sft. gn. M.
				10 a. m.	423–488	sft. gn. M.
				10.32 a. m.	488	sft. gn. M.
				10.36 a. m.	488	sft. gn. M.
D. 4352	Point Loma Lt. Ho., N. 40° E., 13.4 miles.	do	Mar. 14	11.07 a. m.	549	gn. M.
				11.26 a. m.	549–585	gn. M.
				11.28 a. m.	549–585	gn. M.
				12.03 p. m.	585	gn. M.
D. 4353	Point Loma Lt. Ho., N. 47° E., 14.7 miles.	do	Mar. 14	1.38 p. m.	639	gn. M.
				1.38 p. m.	639–628–640	gn. M.
				1.56 p. m.	639–628–640	gn. M.
				2.06 p. m.	628	gn. M.
				2.27 p. m.	640	gn. M.
				2.33 p. m.	640	gn. M.
D. 4354	Point Loma Lt. Ho., N. 49° E., 15.6 miles.	do	Mar. 14	3.11 p. m.	646	gn. M.
				3.28 p. m.	646–650	gn. M.
				3.29 p. m.	646–650	gn. M.
				4.04 p. m.	650	gn. M.

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
57	59	46.0	Tnr. sdr.		50	S. 63° W.	1.1	
58	59		8′ Tnr.; m. b.	Bottom.	24	S. 63° W.	.9	
58	59		Surf. tow	Surface.	16	S. 63° W.	.6	
58	59		Sig. sdr.			None		
59	59	42.0	Sig. sdr.			None		
61	60		Tnr. sdr.		26	S. 81° W.	.7	
61	60		8′ Tnr.; m. b.	Bottom.	16	S. 81° W.	.5	
61	60	48.9	Tnr. sdr.			None		
61	58		Tnr. sdr.		44	S. 85° W.	1.2	
61	58		Surf. tow	Surface.	32	S. 85° W.	1.0	
61	58		Tnr. sdr.			None		
61	58		8′ Tnr.; m. b.	Bottom.	22	S. 85° W.	.7	
60	58		Tnr. sdr.			None		
60	58		Op. plank. ‖	50 fms.	4	None		Bag torn.
60	58		Tnr. sdr.			None		
60	58		Sig. sdr.		55	N. 79° W.	.5	Lost sounding lead.
60	58		Surf. tow	Surface.	18	N. 79° W.	.4	
60	58		8′ Tnr.; m. b.	Bottom.	7	N. 79° W.	.2	Gear fouled on bottom, but no damage.
60	59		Tnr. sdr.		23	S. 77° E.	.4	
60	59		8′ Tnr.; m. b.	Bottom.	16	S. 77° E.	.3	
60	59		Tnr. sdr.			None		
52	57		Tnr. sdr.		35	S. 67° W.	1.3	
52	57		8′ Tnr.; m. b.	Bottom.	23	S. 67° W.	1.1	
55	57	50.4	Tnr. sdr.			None		
57	57		Tnr. sdr.		39	S. 86° W.	.8	
57	57		8′ Tnr.; m. b.	Bottom.	25	S. 86° W.	.6	
58	58		Surf. tow	Surface.	20	S. 86° W.	.5	
60	58	50.4	Tnr. sdr.			None		
62	58		Tnr. sdr.		47	S. 79° W.	1.6	
63	58		Surf. tow	Surface.	30	S. 79° W.	1.0	
64	58		Tnr. sdr.			None		
64	58		8′ Tnr.; m. b.	Bottom.	35	S. 79° W.	1.2	
67	58	48.0	Sig. sdr.			None		
67	58		Tnr. sdr.		57	S. 60° W.	1.2	
67	58		Surf. tow	Surface.	48	S. 60° W.	1.1	
67	58		Tnr. sdr.			None		
67	58		8′ Tnr.; m. b.	Bottom.	45	S. 60° W.	1.0	
68	59		Sig. sdr.			None		
68	59	50.0	Sig. sdr.			None		
68	59		Tnr. sdr.		38	S. 51° W.	1.4	
68	59		8′ Tnr.; m. b.	Bottom.	25	S. 51° W.	1.2	
68	59		Surf. tow	Surface.	19	S. 51° W.	.8	
68	58	49.0	Tnr. sdr.			None		
65	58		Sig. sdr.		1 24	S. 76° W.	1.5	
68	59		Surf. tow	Surface.	46	S. 76° W.	1.2	
71	60		8′ Tnr.; m. b.	Bottom.	30	S. 76° W.	.9	
70	60		Town. int. ‖	125 fms.	12	None		
70	60	40.0	Sig. sdr.			None		
70	59		Sig. sdr.		1 23	S. 71° W.	1.3	
70	59		8′ Tnr.; m. b.	Bottom.	29	S. 71° W.	.7	
70	59		Surf. tow	Surface.	22	S. 71° W.	.4	
68	59	39.0	Sig. sdr.			None		
66	59		Sig. sdr.		1 23	S. 80° W.	1.0	
66	59		Surf. tow	Surface.	50	S. 80° W.	.9	
65	59		8′ Tnr.; m. b.	Bottom.	27	S. 80° W.	.5	
65	59		Sig. sdr.			None		
63	59	39.0	Op. plank. ‖	150 fms.	7	None		
63	59	39.0	Sig. sdr.			None		
61	59		Sig. sdr.		1 17	SW.	1.0	
61	59		8′ Tnr.; m. b.	Bottom.	27	SW.	.5	
61	59		Surf. tow	Surface.	58	SW.	1.0	
61	60	38.5	Sig. sdr.			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.—Continued.		1904.		*fms.*	
D. 4355	At anchor, off Quarantine, San Diego Harbor.	C. S. 5106	Mar. 14	8.20 p. m.	7	gy. M., crs. S
				8.20 p. m.	7	gy. M., crs. S
				9.45 p. m.	7	gy. M., crs. S
H. 4791	Point Loma Lt. Ho., N. 31° E., 2.6 miles.	C. S. 5100	Mar. 15	7.49 a. m.	37	fne. gy. S
D. 4356	Point Loma Lt. Ho., N. 82° 30′ E., 5.9 miles.	...do...	Mar. 15	8.25 a. m.	120	gn. M
				8.35 a. m.	120–131	gn. M
				9.04 a. m.	131	gn. M
				9.06 a. m.	131	gn. M
D. 4357	Point Loma Lt. Ho., N. 81° E., 7.5 miles.	...do...	Mar. 15	9.20 a. m.	134	gn. M
				9.25 a. m.	134–155	gn. M
				9.32 a. m.	142–155	gn. M
				9.33 a. m.	142	gn. M
				9.56 a. m.	155	gn. M
				9.57 a. m.	155	gn. M
D. 4358	Point Loma Lt. Ho., N. 82° 30′ E., 8.2 miles.	...do...	Mar. 15	10.11 a. m.	167	gn. M
				10.17 a. m.	167–191	gn. M
				10.20 a. m.	177–191	gn. M
				10.23 a. m.	177	gn. M
				10.47 a. m.	191	gn. M
				10.55 a. m.	191	gn. M
D. 4359	Point Loma Lt. Ho., N. 85° E., 9 miles.	...do...	Mar. 15	10.55 a. m.	191	gn. M
				11.11 a. m.	191–220–98	gn. M., br. Sp., R.
				11.17 a. m.	220–98	gn. M., br. Sp., R.
				11.18 a. m.	220	gn. M., br. Sp
				11.42 a. m.	98	gn. M., br. Sp
				11.43 a. m.	98	gn. M., br. Sp
D. 4360	Point Loma Lt. Ho., N. 86° 30′ E., 9.4 miles.	...do...	Mar. 15	1.06 p. m.	108	R
				1.12 p. m.	108–92	fne. gy. S., R
				1.30 p. m.	92	fne. gy. S., R
				1.35 p. m.	2	fne. gy. S., R
D. 4361	Point Loma Lt. Ho., N. 87° E., 9.9 miles.	...do...	Mar. 15	1.45 p. m.	97	fne. gy. S
				1.51 p. m.	97–91–93	gy. S., M., Sp. R.
				1.55 p. m.	91	fne. gy. S., bk. Sp.
				1.58 p. m.	91–93	fne. gy. S., bk. Sp.
				2.05 p. m.	93	gy. S., R
D. 4362	Point Loma Lt. Ho., N. 89° 30′ E., 10.2 miles.	...do...	Mar. 15	2.36 p. m.	100	fne. gy. S., bk. Sp.
				2.40 p. m.	100–159	fne. gy. S., bk. Sp.
				2.41 p. m.	100–159	fne. gy. S., bk. Sp.
				2.55 p. m.	159	fne. gy. S., bk. Sp.
D. 4363	Point Loma Lt. Ho., N. 81° E., 11.1 miles.	...do...	Mar. 15	3.08 p. m.	207	fne. gy S
				3.16 p. m.	207–348	gn. M., fne. S
				3.27 p. m.	315	gn. M
				3.49 p. m.	348	gn. M
D. 4364	Point Loma Lt. Ho., S. 81° E., 5.5 miles.	...do...	Mar. 16	8.44 a. m.	101	gy. S., R
				8.50 a. m.	101–129	gy. S., M., R
				9.12 a. m.	129	gn. M
				9.13 a. m.	129	gn. M
D. 4365	Point Loma Lt. Ho., S. 81° E., 6.2 miles.	...do...	Mar. 16	9.25 a. m.	130	gn. M
				9.34 a. m.	130–158	gn. M
				9.54 a. m.	158	gn. M
				10.00 a. m.	158	gn. M
D. 4366	Point Loma Lt. Ho., S. 82° E., 7 miles.	...do...	Mar. 16	10.10 a. m.	176	gn. M
				10.14 a. m.	176–181	gn. M
				10.35 a. m.	181	gn. M
				10.36 a. m.	181	gn. M
D. 4367	Point Loma Lt. Ho., S. 82° 30′ E., 7.8 miles.	...do...	Mar. 16	10.51 a. m.	201	gn. M
				10.56 a. m.	201–215	gn. M
				11.20 a. m.	215	gn. M
D. 4368	Point Loma Lt. Ho., S. 83° E., 8.5 miles.	...do...	Mar. 16	11.35 a. m.	240	gn. M
				11.38 a. m.	240	gn. M
				12.00 m.	240	gn. M
D. 4369	Point Loma Lt. Ho., S. 82° E., 10 miles.	...do...	Mar. 16	1.08 p. m.	260	gn. M
				1.16 p. m.	260–284	gn. M., S., R
				1.44 p. m.	284	gy. S., R
H. 4792	Point Loma Lt. Ho., S. 88° E., 10.8 miles.	...do...	Mar. 16	2.09 p. m.	198	gy. S
H. 4793	Point Loma Lt. Ho., S. 89° E., 10.3 miles.	...do...	Mar. 16	2.15 p. m.	179	gy. S
D. 4370	Point Loma Lt. Ho., N. 88° E., 10 miles.	...do...	Mar. 16	2.27 p. m.	99	gy. S., R
				2.32 p. m.	99–147	gy. S., R
				2.46 p. m.	147	gy. S., R

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
57	59	......	Hand lead					Night anchorage.
57	59	......	Elec. surf. light, 2 dip nets.	Surface	1 45	None		Tide ebbing latter part of trial.
57	59	......	Op. plank.‖	7 fms	3	None		
56	57	......	Tnr. sdr		5	None		
57	57	......	Tnr. sdr		48	S. 77° W.	1.7	
57	57	......	8′ Tnr.; m. b.	Bottom.	28	S. 77° W.	1.2	
56	57	48.2	Town. int.‖	100 fms.	7	None		
55	57	48.2	Tnr. sdr			None		
55	58	......	Tnr. sdr		45	N. 83° W.	.7	
55	58	......	8′ Tnr.; m. b.	Bottom.	28	N. 83° W.	.5	
55	58	......	Surf. tow	Surface.	21	N. 83° W.	.4	
56	58	......	Tnr. sdr			None		
57	59	46.8	Town. int.‖	100 fms.	7	None		
57	59	46.8	Tnr. sdr			None		
57	59	......	Tnr. sdr		50	N. 60° W.	.9	
57	59	......	8′ Tnr.; m. b.	Bottom.	28	N. 60° W.	.6	
57	59	......	Surf. tow	Surface.	25	N. 60° W.	.6	
57	59	......	Tnr. sdr			None		
58	60	45.4	Town. int.‖	100 fms.	7	None		Temperature at 100 fms., 48.9°.
59	60	45.4	Sig. sdr			None		Also beginning of next station.
59	60	45.4	Sig. sdr		50	N. 69° W.	.6	Position same as end of preceding station.
60	60	......	8′ Tnr.; m. b.	Bottom.	23	N. 69° W.	.4	Frame lost; fragments of net recovered.
61	60	......	Surf. tow	Surface.	21	N. 69° W.	.4	
61	60	......	Sig. sdr			None		
64	60	49.0	Town. int.‖	100 fms.	6	None		
64	60	49.0	Sig. sdr			None		
68	60	......	Tnr. sdr		30	N. 86° W.	.4	
68	60	......	8 swabs; m. b.	Bottom.	7	N. 86° W.	.2	Mud bag slightly damaged.
66	60	......	Op. plank.‖	100 fms.	3	None		
66	60	......	Tnr. sdr			None		
65	60	......	Tnr. sdr		26	N. 28° W.	.5	
65	60	......	8 swabs; m. b.	Bottom.	15	N. 28° W.	.4	
65	60	......	Tnr. sdr			None		
64	60	......	Surf. tow	Surface.	7	N. 28° W.	.2	
64	60	......	Tnr. sdr					
64	60	......	Tnr. sdr		28	S. 27° W.	1.8	
64	60	......	Surf. tow	Surface.	16	S. 27° W.	1.2	
64	60	......	8 swabs; m. b.	Bottom.	15	S. 27° W.	1.2	
64	60	......	Tnr. sdr			None		
64	60	......	Tnr. sdr		52	S. 55° W.	.8	
64	60	......	8′ Tnr.; m. b.	Bottom.	26	S. 55° W.	.6	
64	60	42.8	Sig. sdr			None		
63	60					None		
63	59	......	Tnr. sdr		36	N. 81° W.	.6	
63	59	......	8′ Tnr.; m. b.	Bottom.	24	N. 81° W.	.5	
63	59	48.0	Op. plank.‖	100 fms.	7	None		
63	59	48.0	Tnr. sdr			None		
63	59	......	Tnr. sdr		40	W.	.8	
65	59	......	8′ Tnr.; m. b.	Bottom.	20	W.	.6	
70	59	47.0	Op. plank.‖	100 fms.	4	None		
71	59	47.0	Sig. sdr			None		
71	59	......	Sig. sdr		31	N. 84° W.	.8	
71	59	......	8′ Tnr.; m. b.	Bottom.	20	N. 84° W.	.6	
72	59	46.0	Op. plank.‖	150 fms.		None		
72	59	46.0	Sig. sdr			None		
73	59	......	Sig. sdr		38	W.	.7	
73	59	......	8′ Tnr.; m. b.	Bottom.	19	W.	.5	
74	60	45.0	Sig. sdr			None		
73	59	......	Sig. sdr		30	N. 79° W.	1.[illegible]	
73	59	......	8′ Tnr	Bottom.	19	N. 79° W.	.7	
73	59	43.8	Sig. sdr			None		
66	60	......	Sig. sdr		50	N. 81° W.	1.1	
66	60	......	8′ Tnr.; m. b.	Bottom.	20	N. 81° W.	.7	
65	59	43.0	Sig. sdr			None		
64	59	......	Tnr. sdr		6	None		
64	59	......	Tnr. sdr		5	None		
64	59	......	Sig. sdr		27	S. 89° W.	.4	
64	59	......	8 swabs; m. b.	Bottom.	13	S. 89° W.	.3	
62	59	......	Sig. sdr			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.—Continued.		1904.		*fms.*	
D. 4371	Point Loma Lt. Ho., N. 84° E., 9.5 miles.	C. S. 5100	Mar. 16	3.12 p. m.	145	gy. S., R
				3.20 p. m.	145–89	gy. S., R
				3.27 p. m.	89	gy. S., R
D. 4372	Point Loma Lt. Ho., N. 82° 30′ E., 9.8 miles.	do	Mar. 16	3.50 p. m.	87	gy. S., R
				3.53 p. m.	87–102	gy. S., R
				4.08 p. m.	102	gy. S., R
D. 4373	Point Loma Lt. Ho., S. 85° E., 9.3 miles.	do	Mar. 17	8.55 a. m.	225	gn. M., S., R
				9.24 a. m.	170	gn. M., S., R
				9.24 a. m.	170–95	gn. M., S., R
				9.49 a. m.	95	gn. M., S., R
D. 4374	Point Loma Lt. Ho., N. 85° E., 9.8 miles.	do	Mar. 17	9.51 a. m.	93	crs. S., Sh., R
				9.56 a. m.	93–88	crs. S., Sh., R
				10.00 a. m.	93–88	crs. S., Sh., R
				10.15 a. m.	88	crs. S., Sh., R
D. 4375	Point Loma Lt. Ho., N. 81° E., 10.1 miles.	do	Mar. 17	10.17 a. m.	88	crs. S., Sh., R
				10.26 a. m.	88–86	crs. S., Sh., R
				10.30 a. m.	88–86	crs. S., Sh., R
				10.45 a. m.	86	crs. S., Sh., R
D. 4376	Point Loma Lt. Ho., N. 86° 30′ E., 10.3 miles.	do	Mar. 17	10.52 a. m.	93	gy. S., Sh., R
				10.55 a. m.	93–164	gy. S., Sh., R
				11.04 a. m.	164	gy. S., Sh., R
H. 4794	Point Loma Lt. Ho., N. 76° E., 8.5 miles.	do	Mar. 17	12.05 p. m.	102	gy. S., R
H. 4795	Point Loma Lt. Ho., N. 67° E., 9.8 miles.	do	Mar. 17	1.19 p. m.	97	gy. S., R
H. 4796	Point Loma Lt. Ho., N. 63° E., 9.9 miles.	do	Mar. 17	1.47 p. m.	103	gy. S., R
D. 4377	Point Loma Lt. Ho., N. 57° E., 10.2 miles.	do	Mar. 17	2.16 p. m.	127	gn. M., S
				2.20 p. m.	145	gn. M., S
				2.20 p. m.	145–299	gn. M., S
				2.28 p. m.	213–299	gn. M., S
				2.30 p. m.	213	gn. M., S
				2.42 p. m.	299	gn. M., S
				2.42 p. m.	299	gn. M., S
D. 4378	Point Loma Lt. Ho., N. 57° E., 11 miles.	do	Mar. 17	2.54 p. m.	376	gn. M., S
				3.11 p. m.	458–594	gn. M., S
				3.13 p. m.	458	gn. M., S
				3.40 p. m.	594	gn. M., S
				3.46 p. m.	594	gn. M., S
				3.58 p. m.	594	gn. M., S
D. 4379	S. point North Coronado Island, N. 52° 30′ E., 2.1 miles.	do	Mar. 18	9.06 a. m.	257	gn. M., br. Sp., R
				9.22 a. m.	320	gn. M., br. Sp., R
				9.23 a. m.	320–408	gn. M., br. Sp., R
				9.40 a. m.	408	gn. M., br. Sp., R
D. 4380	S. point North Coronado Island, N. 59° E., 2.5 miles.	do	Mar. 18	10.08 a. m.	530	gy. S
				10.26 a. m.	530–618	gn. M., gy. S
				10.50 a. m.	618	gn. M
				10.50 a. m.	618	gn. M
				10.55 a. m.	618	gn. M
D. 4381	S. point North Coronado Island, N. 64° E., 4 miles.	do	Mar. 18	10.55 a. m.	618	gn. M
				11.30 a. m.	618–654	gn. M
				11.46 a. m.	654–667	gn. M
				11.47 a. m.	654	gn. M
				11.52 a. m.	654–667	gn. M
				12.15 p. m.	667	gn. M
D. 4382	S. point North Coronado Island, N. 64° E., 5.4 miles.	do	Mar. 18	1.15 p. m.	656	gn. M
				1.30 p. m.	642–666	gn. M
				1.32 p. m.	642	gn. M
				1.37 p. m.	642–666	gn. M
				2.02 p. m.	666	gn. M
				2.06 p. m.	666	gn. M
				2.06 p. m.	666	gn. M
D. 4383	N. point North Coronada Island, S. 79° E., 2.3 miles.	do	Mar. 18	3.12 p. m.	287	gn. M
				3.21 p. m.	326	gn. M
				3.22 p. m.	326–363	gn. M
				3.22 p. m.	326–363	gn. M
				3.35 p. m.	363	gn. M
				3.36 p. m.	395	gn. M
				3.43 p. m.	395	gn. M

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
60	59		Sig. sdr		30	S. 52° W	.4	
60	59		8 swabs; m. b	Bottom.	15	S. 52° W	.3	Lost mud bag.
60	59		Sig. sdr			None		
59	59		Sig. sdr		22	S. 2° W	1.7	
59	59		3 swabs		16	S. 2° W	1.3	Lost one swab.
59	59		Sig. sdr			None		
60	59		Sig. sdr		50	S. 19° W	1.6	
60	59		Sig. sdr			None		
60	59		8 swabs	Bottom.	17	S. 19° W	.6	
60	59		Sig. sdr			None		
60	59		Sig. sdr		25	S. 8° W	.9	
60	59		8 swabs	Bottom.	15	S. 8° W	.7	
59	59		2 hand lines	Bottom.	15	S. 8° W	.5	
59	59		Sig. sdr			None		
59	59		Sig. sdr		30	S. 7° W	.8	
60	59		8 swabs	Bottom.	15	S. 7° W	.6	
60	59		2 hand lines	Bottom.	15	S. 7° W	.5	
61	60		Sig. sdr			None		
62	60		Sig. sdr		16	S. 77° W	.5	
62	60		8 swabs	Bottom.	7	S. 77° W	.3	
62	60		Sig. sdr			None		
61	60		Sig. sdr			None		
59	60		Sig. sdr			None		
59	60		Sig. sdr			None		
59	60		Sig. sdr		31	S. 54° W	.9	
59	60		Sig. sdr			None		
59	60		8′ Tnr	Bottom.	20	S. 54° W	.6	
59	60		Surf. tow	Surface.	12	S. 54° W	.4	
59	60		Sig. sdr			None		
60	60		Op. plank.‖	100 fms.	4	None		
60	60		Sig. sdr			None		
60	60		Sig. sdr		1 20	S. 84° W	.8	
61	60		8′ Tnr.; m. b	Bottom.	31	S. 84° W	.5	
61	60		Sig. sdr			None		
61	60		Sig. sdr			None		
61	60		Op. plank.‖	150 fms.	9	None		
61	60		Town. int. ‖	150 to 50 fms.	5	None		
62	59		Sig. sdr		44	S. 84° W	.5	
63	59		Sig. sdr			None		
63	59		8′ Tnr.; m. b	Bottom.	8	S. 84° W	.2	
64	59	41.1	Sig. sdr			None		
66	59		Sig. sdr		1 15	S. 73° W	1.5	
68	59		8′ Tnr	Bottom.	22	S. 73° W	.8	
71	60	38.9	Op. plank.‖	100 fms.	7	None		Hauled simultaneously on
71	60	38.9	Town. int. ‖	200 to 100 fms.	7	None		same line.
72	60	38.9	Sig. sdr			None		
72	60	38.9	Sig. sdr		2 12	S. 64° W	1.4	Position same as end of preceding station.
73	60		Surf. tow	Surface.	18	S. 64° W	.3	
73	60		8′ Tnr	Bottom.	47	S. 64° W	1.1	
73	60		Sig. sdr			None		
74	60		Surf. tow	Surface.	43	S. 64° W	1.0	
74	60		Sig. sdr			None		
72	61		Sig. sdr		1 17	S. 69° W	1.3	
71	61		Surf. tow	Surface.	26	S. 69° W	.8	
71	61		Sig. sdr			None		
71	61		10′ Blk	Bottom.	20	S. 69° W	.6	
68	61	42.5	Sig. sdr			None		
68	61	42.5	Op. plank.‖	100 fms.	6	None		Hauled simultaneously on
68	61	42.5	Town. int. ‖	200 to 100 fms.	6	None		same line.
68	61		Sig. sdr		40	N. 73° W	.7	
68	61		Sig. sdr			None		
68	61		10′ Blk	Bottom.	10	N. 73° W	.3	Net wrecked.
68	61		Surf. tow	Surface.	12	N. 73° W	.4	
68	61		Sig. sdr			None		
68	61	41.5	Op. plank. ‖	100 fms.	4	None		
68	61	41.5	Sig. sdr			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.— Continued.					
			1904.		*fms.*	
D. 4384	Point Loma Lt. Ho., N. 68° E., 7.7 miles.	C. S. 5100..	Mar. 21	9.34 a. m.	139	gy. S., R........
				9.55 a. m.	164	gy. S., R........
				9.56 a. m.	164-85	gy. S., R........
				10.05 a. m.	139	gy. S., R........
				10.06 a. m.	139-85	gy. S., R........
				10.25 a. m.	85	gy. S., R........
H. 4797	Point Loma Lt. Ho., N. 71° E., 8.6 miles.	.....do....	Mar. 21	10.28 a. m.	85	gy. S., R........
D. 4385	Point Loma Lt. Ho., N. 71° E., 9.2 miles.	.....do....	Mar. 21	10.41 a. m.	89	crs. S., R........
				10.42 a. m.	89-80	crs. S., R........
				10.43 a. m.	89-80	crs. S., R........
				10.57 a. m.	80	crs. S., R........
H. 4798	Point Loma Lt. Ho., N. 59° E., 9.2 miles.	.....do....	Mar. 21	11.13 a. m.	93	crs. S., R........
H. 4799	Point Loma Lt. Ho., N. 57° E., 9 miles.	.....do....	....	11.18 a. m.	95	crs. S., R........
H. 4800	Point Loma Lt. Ho., N. 55° E., 8.8 miles.	.....do....	Mar. 21	11.28 a. m.	98	crs. S., R........
H. 4801	Point Loma Lt. Ho., N. 53° E., 8.6 miles.	.....do....	Mar. 21	11.33 a. m.	89	crs. S., R........
H. 4802	Point Loma Lt. Ho., N. 51° E., 8.7 miles.	.....do....	Mar. 21	11.39 a. m.	87	crs. S., R........
D. 4386	32° 30′ 30″ N., 118° 05′ 10″ W..	.....do....	Mar. 21	4.17 p. m.	1,012	(No specimen)....
				4.45 p. m.	1,012	(No specimen)....
				4.45 p. m.	1,012	(No specimen)....
				6.06 p. m.	1,012	(No specimen)....
				6.26 p. m.	1,012	(No specimen)....
				7.10 p. m.	1,012	(No specimen)....
D.4387a	32° 32′ 40″ N., 118° 04′ 20″ W..	.....do....	Mar. 22	8.05 a. m.	1,059	(No specimen)....
				9.23 a. m.	1,059	gn. M............
				9.27 a. m.	1,059	gn. M............
				9.56 a. m.	1,059	gn. M............
				9.56 a. m.	1,059	gn. M............
				11.12 a. m.	1,059	gn. M............
				11.56 a. m.	1,059	gn. M............
				1.43 p. m.	1,059	gn. M............
				1.43 p. m.	1,059	gn. M............
				1.43 p. m.	1,059	gn. M............
				1.43 p. m.	1,059	gn. M............
				1.43 p. m.	1,059	gn. M............
	Gulf of Santa Catalina, coast of southern California.					
D.4387b	32° 29′ 30″ N., 118° 05′ W	C. S. 5100..	Mar. 22	2.50 p. m.	1,000*	(No sounding)....
				3.33 p. m.	1,000	M., crs. S., G.....
D. 4388	32° 20′ N., 117° 57′ W.........	.....do....	Mar. 23	9.20 a. m.	....	(No sounding)....
	Vicinity of San Diego, Cal.					
D. 4389	Point Loma Lt. Ho., N. 53° E., 11.9 miles.	C. S. 5100..	Mar. 24	3.45 p. m.	608	gn. M............
				4.05 p. m.	608	gn. M............
				4.40 p. m.	671	gn. M., gy. S......
				4.45 p. m.	671-639	gn. M., gy. S......
				4.49 p. m.	671-639	gn. M., gy. S......
				5.13 p. m.	671-639	gn. M., gy. S......
				6.00 p. m.	671-639	gn. M., gy. S......
				6.00 p. m	671-639	gn. M., gy. S......
				6.04 p. m.	671-639	gn. M., gy. S......
				6.15 p. m.	671-639	gn. M., gy. S......
				6.58 p. m.	639	gn. M., gy. S......
				7.24 p. m.	639	gn. M., gy. S......
				7.42 p. m.	639	gn. M., gy. S......

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.			Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.		Direction.	Distance.	
°F.	°F.	°F.			h.	m.		mi.	
65	60	......	Sig. sdr	....		58	N. 88° W.	1.5	
67	60	......	Sig. sdr	....		......	None	......	
67	60	......	8 swabs	Bottom.		30	N. 88° W.	.8	
68	60	......	Sig. sdr	....		......	None	......	
68	60	......	Surf. tow	Surface.		20	N. 88° W.	.6	
66	60	......	Sig. sdr	....		......	None	......	
65	60	......	Sig. sdr	....		......	None	......	
63	60	......	Sig. sdr	....		21	S. 15° E.	1.2	
63	60	......	Surf. tow	Surface.		16	S. 15° E.	1.0	
63	60	......	8 swabs	Bottom.		13	S. 15° E.	.9	
62	60	......	Sig. sdr	....		......	None	......	
60	59	......	Sig. sdr	....		......	None	......	
60	59	......	Sig. sdr	....		......	None	......	
60	59	......	Sig. sdr	....		......	None	......	
60	59	......	Sig. sdr	....		......	None	......	
60	59	......	Sig. sdr	....		......	None	......	
58	59	......	Sig. sdr	....	4	0	N. 75° W.	5.0	Lost sounding cup.
58	59	......	Op. plank. ‖	50 fms.		5	None	......	Hauled simultaneously on same line.
58	59	......	Town. int. ¶	200 to 100 fms.		5	None	......	
57	59	......	Surf. tow	Surface.	1	30	N. 75° W.	3.8	6 hauls (15 minutes each) between 6.06 and 8.08 p. m.
57	59	......	Op. plank. inside surf. tow.	Surface.		30	N. 75° W.	1.2	2 hauls (15 minutes each) between 6.26 and 7.03 p. m.
56	59	......	Op. plank	Surface.		45	N. 75° W.	1.9	3 hauls (15 minutes each) between 7.10 and 8.08 p. m.
57	59	......	Sig. sdr	....	6	53	S. 10° W.	4.0	Lost sounding lead.
60	60	......	10′ Blk	Bottom.		16	S. 10° W.	.5	Big load of mud brought up.
60	60	......	Surf. tow	Surface.		13	S. 10° W.	.4	
60	60	......	Op. plank. ‖	100 fms.		11	None	......	Hauled simultaneously on same line.
60	60	......	Town. int. ¶	200 to 100 fms.		11	None	......	
58	59	......	Op. plank. ‖	310 fms.		8	None	......	Hauled on sounding wire.
58	59	......	Op. plank. ‖	500 fms.		8	None	......	
60	60	......	Op. plank. ‖	50 fms.		4	None	......	Small open pankton net secured at each position on dredge rope and hauled vertically and simultaneously. Townsend intermediate net, open, used instead of plankton net at 1,000 fms.
60	60	......	Op. plank. ‖	100 fms.		10	None	......	
60	60	......	Op. plank. ‖	200 fms.		16	None	......	
60	60	......	Op. plank. ‖	300 fms.		22	None	......	
60	60	......	Town. int. ‖	1,000 fms	1	5	None	......	
60	60	......	....	....	1	52	S. 80° E.	3.0	
60	60	......	8′ Tnr	Bottom.		17	S. 80° E.	.5	Net evidently dragged upside down.
60	59	......	Op. plank	Surface.		6	N. 75° W.	.3	Towed astern from sounding machine.
57	57	......	Sig. sdr	....	5	8	S. 32° W.	1.8	
57	57	......	Op. plank. ‖	300 fms.		5	None	......	
57	57	......	Sig. sdr	....		......	None	......	
57	58	......	8′ Tnr	Bottom.		31	S. 32° W.	1	
57	58	......	Surf. tow	Surface.		13	S. 32° W.	.4	
58	59	......	Surf. tow	Surface.		10	S. 32° W.	.3	
57	58	......	Op. plank. ‖	Surface.		10	....	......	
57	58	......	Surf. tow	Surface.		38	S. 32° W.	1.2	3 hauls between 6 and 6.50 p. m.; port boom.
57	58	......	Op. plank. ‖	500 fms.		9	None	......	Hauled on sounding wire.
57	58	......	Surf. tow	Surface.		26	S. 32° W.	.8	2 hauls between 6.15 and 6.50 p. m.; starboard boom.
56	58	......	Town. int. ¶	200 to 150 fms.		3	None	......	
55	58	......	Town. int. ¶	200 to 100 fms.		8	None	......	
55	57	......	Town. int. ¶	200 to 50 fms.		11	None	......	

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Vicinity of San Diego, Cal.—Continued.		1904.		*fms.*	
D. 4389	Point Loma Lt. Ho., N. 53° E., 11.9 miles.	C. S. 5100	Mar. 24	7.56 p. m.	639	gn. M., gy. S
				8.12 p. m.	639	gn. M
				8.25 p. m.	639	gn. M
				8.26 p. m.	639	gn. M
	Off Santa Catalina Islands, coast of southern California.					
D. 4390	33° 02′ 15″ N., 120° 42′ W	C. S. 5002	Mar. 28	6.33 a. m.	2,182	gy. M., fne. S
				8.54 a. m.	2,182	gy. M., fne. S
				9.09 a. m.	2,182–1,350	gy. M., fne. S
				9.18 a. m.	2,182–1,350	gy. M., fne. S
D. 4391	33° 02′ 15″ N., 120° 36′ 30″ W	do	Mar. 28	1.21 p. m.	1,350*	(No sounding)
				1.23 p. m.	1,350–675	gn. M., bk. Sp., Glob., R.
				2.55 p. m.	1,350–675	gn. M., bk. Sp., Glob., R.
				4.15 p. m.	675	gn. M., Glob., fne. S.
				4.30 p. m.	675	gn. M., Glob., fne. S.
				5.35 p. m.	675	gn. M., Glob., fne. S.
D. 4392	33° 00′ 50″ N., 120° 45′ 20″ W	do	Mar. 29	1.31 p. m.	2,124	lt. gn. gy. M
				3.21 p. m.	2,124	lt. gn. gy. M
				4.32 p. m.	2,124	lt. gn. gy. M
				6.20 p. m.	2,124	lt. gn. gy. M
				7.25 p. m.	2,124	lt. gn. gy. M
D. 4393	32° 54′ 20″ N., 121° 11′ 15″ W	do	Mar. 30	6.32 a. m.	2,113	sft. gy. M
				9.40 a. m.	2,113–2,259	sft. gy. M
				11.13 a. m.	2,259	sft. gy. M
D. 4394	32° 54′ 20″ N., 121° 15′ W	do	Mar. 30	11.13 a. m.	2,259	sft. gy. M
				2.33 p. m.	2,259	sft. gy. M
D. 4395	33° 01′ 35″ N., 121° 28′ 30″ W	do	Mar. 31	6.28 a. m.	2,045	bl. gy. M
				8.12 a. m.	2,045–2,228	bl. gy. and rd. M
				11.27 a. m.	2,228	rd. M
D. 4396	33° 01′ 35″ N., 121° 32′ W	do	Mar. 31	11.27 a. m.	2,228	rd. M
				2.32 p. m.	2,228	rd. M
				5.42 p. m.	2,228	rd. M
				7.07 p. m.	2,228	rd. M
D. 4397	33° 10′ 15″ N., 121° 42′ 15″ W	do	Apr. 1	6.29 a. m.	2,196	gy. M
				8.43 a. m.	2,196–2,228	gy. M
				11.01 a. m.	2,228	gy. M
				11.30 a. m.	2,228	gy. M
	From San Diego, Cal., through Santa Catalina and Santa Barbara islands.					
D. 4398	32° 43′ 20″ N., 117° 42′ 10″ W	C. S. 5100	Apr. 7	1.32 p. m.	620	gn. M., R
				2.09 p. m.	620	gn. M., R
				2.10 p. m.	620	gn. M., R
H. 4803	32° 44′ 20″ N., 117° 46′ 45″ W	do	Apr. 7	3.48 p. m.	154	fne. gy. S., bk. Sp., R.
D. 4399	32° 44′ 50″ N., 117° 48′ 45″ W	do	Apr. 7	4.10 p. m.	245	fne. gy. S., R
				4.18 p. m.	245–285	fne. gy. S., R
				4.30 p. m.	264	fne. gy. S., R
				4.32 p. m.	264–285	fne. gy. S., R
				4.47 p. m.	285	fne. gy. S., R
				5.38 p. m.	285	fne. gy. S., R

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
55	57	......	Op. plank. ‖	250 fms.	15	None	......	
55	57	......	Sig. sdr			None		
55	57	......	Surf. tow	Surface	28	S. 32° W.	.8	
55	57	......	Op. plank	Surface	27	S. 32° W.	.8	
60	61	35.0	Sig. sdr		5 53	E	5.0	
60	61	......	Surf. tow	Surface	15	E	.5	
60	61	......	8′ Tnr	Bottom.	38	E	1.2	
60	61	......	Surf. tow	Surface	10	E	.3	
63	61	......			4 24	S. 55° E.	4.0	Position approximately same as end of preceding station.
63	61	......	Surf. tow	Surface	1 26	S. 55° E.	3.0	5 hauls between 1.23 and 3.21 p. m.
62	62	......	8′ Tnr	Bottom.	33	S. 55° E.	.5	Frame lost; only fragments of net recovered.
61	62	......	Town. int. ¶	200 to 100 fms.	2	None	......	
61	62	......	Sig. sdr			None		
60	61	......	Town. int. ‖	200 fms.	10	None	......	
58	59	......	Sig. sdr		7 38	S	6.0	
56	59	......	Town. int. ¶	1,000 to 500 fms.	20	None	......	
57	59	......	Surf. tow	Surface	20	S	.6	
56	59	......	Surf. tow	Surface	40	S	1.3	2 hauls between 6.20 and 7.15 p. m.
55	59	......	Op. plank	Surface	1 5	S	2.1	6 hauls between 7.25 and 8.40 p. m.
55	58	......	Sig. sdr		5 39	W	4.0	
57	59	......	8′ Tnr	Bottom.	32	W	1.0	
59	58	......	Sig. sdr			None		
59	58	......	Sig. sdr		5 41	W	4.0	Position same as end of preceding station.
55	59	......	5½′ Blk	Bottom.	32	W	1.1	Gear slightly damaged. Temperature at 1,010 fms., 37.9°.
54	58	......	Sig. sdr		5 50	W	3.5	
55	59	......	5½′ Blk	Bottom.	40	W	.8	Lost frame; net wrecked.
56	59	35.0	Sig. sdr			None		Harpooned a large sunfish.
56	59	35.0	Sig. sdr		9 23	NW	10.0	Position same as end of preceding station.
56	59	......	8′ Tnr	Bottom.	21	NW	.6	
57	59	......	Op. plank	Surface	1 10	NW	2.2	7 hauls (10 minutes each) between 5.42 and 7.05 p. m.
56	58	......	Op. plank. and elec. surf. light.	Surface	1 20	NW	2.4	8 hauls (10 minutes each) between 7.07 and 8.50 p. m.
55	59	35.0	Sig. sdr		5 22	SW	4.0	
59	58	......	8′ Tnr	Bottom.	26	SW	.9	
65	60	......	Sig. sdr			None		
65	60	......	Op. plank	Surface	3	SW	.1	
64	61	......	Sig. sdr		1 48	N. 77° W.	2.0	
64	62	......	8′ Tnr	Bottom.	21	N. 77° W.	.8	Frame bent; net slightly damaged.
64	62	......	Surf. tow	Surface	20	N. 77° W.	.8	
63	62	......	Sig. sdr			None		
63	62	......	Sig. sdr		3 50	N. 67° W.	4.0	
63	62	......	Op. plank	Surface	24	N. 77° W.	1.1	2 hauls between 4.18 and 4.46 p. m.
63	62	......	Sig. sdr			None		
63	62	......	8′ Tnr	Bottom.	14	N. 67° W.	.7	Net badly torn.
62	62	......	Sig. sdr			None		
62	62	......	Op. plank	Surface	40	N. 67° W.	2.0	8 hauls (5 minutes each) between 5.38 and 7.58 p. m.

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From San Diego, Cal., through Santa Catalina and Santa Barbara islands—Continued.		1904.		*fms.*	
D.4400	32° 50′ 20″ N., 118° 03′ 30″ W.	C. S. 5100	Apr. 8	7.30 a.m.	500	gn. M.
				8.05 a.m.	500–507	gn. M.
				8.48 a.m.	507	gn. M.
D.4401	32° 52′ 40″ N., 118° 13′ 40″ W.	...do...	Apr. 8	10.20 a.m.	468	gn. M., bk. S., D.
				10.57 a.m.	468–448	gn. M., bk. S., D.
				11.34 a.m.	448	R.
D.4402	E. point Northwest Harbor, San Clemente Island, N. 74° W., 5.8 miles.	...do...	Apr. 8	1.22 p.m.	542	gn. M.
				1.51 p.m.	542–599	gn. M.
				2.31 p.m.	599	gn. M.
D.4403	E. point Northwest Harbor, San Clemente Island, N. 68° 30′ W., 5.4 miles.	...do...	Apr. 8	2.31 p.m.	599	gn. M.
				3.35 p.m.	599–505	gn. M., bk. G., Sh., R.
				4.17 p.m.	505	bk. G., Sh., R.
D.4404	At anchor, Wilson Cove, San Clemente Island.	...do...	Apr. 8	7.30 p.m.	15	S., R.
				7.30 p.m.	15	S., R.
				7.30 p.m.	15	S., R.
D.4405	E. point Northwest Harbor, San Clemente Island, S. 72° W., 2.9 miles.	...do...	Apr. 9	7.46 a.m.	654	gn. M.
				8.16 a.m.	654–704	gn. M.
				9.00 a.m.	704	gn. M.
D.4406	SE. point Santa Catalina Island, N. 32° E., 8.2 miles.	...do...	Apr. 9	10.34 a.m.	650	gn. M.
				11.07 a.m.	650	gn. M.
D.4407	SE. point Santa Catalina Island, N. 19° 30′ E., 3.2 miles.	...do...	Apr. 9	1.27 p.m.	334	gy. S., R.
				1.55 p.m.	478	gy. S., R.
				1.55 p.m.	478–600	gy. S., R.
				2.27 p.m.	600	gy. S., R.
D.4408	SE. point Santa Catalina Island, S. 57° W., 2.5 miles.	...do...	Apr. 9	3.29 p.m.	117	gy. S., R.
				3.37 p.m.	117–104	gy. S., R.
				4.08 p.m.	104	gy. S., R.
D.4409	SE. point Santa Catalina Island, SW., 2.1 miles.	...do...	Apr. 9	4.20 p.m.	88	fne. gy. S.
				4.21 p.m.	88–52	fne. gy. S.
				4.53 p.m.	52	fne. gy. S.
D.4410	Long Point, Santa Catalina Island, N. 79° W., 2.8 miles.	...do...	Apr. 11	7.37 a.m.	178	fne. gy. S., R.
				7.50 a.m.	178–195	gy. S., G., R.
				8.04 a.m.	195	gy. S., G., R.
D.4411	Long Point, Santa Catalina Island, S. 18° 30′ E., 2.6 miles.	...do...	Apr. 11	8.55 a.m.	143	fne. gy. S.
				9.04 a.m.	143–245	gy. S., Sh.
				9.38 a.m.	245	gy. S., Sh.
D.4412	Bird Rock, Santa Catalina Island, S. 69° W., 3 miles.	...do...	Apr. 11	10.01 a.m.	274	gn. M.
				10.14 a.m.	274–265	gn. M., G., R.
				10.46 a.m.	265	gn. M., G., R.
D.4413	Bird Rock, Santa Catalina Island, S. 15° E., 2.1 miles.	...do...	Apr. 11	11.17 a.m.	152	dk. gy. S.
				11.24 a.m.	152–162	fne. gy. S.
D.4414	NW. point Santa Catalina Island, S. 77° E., 4.8 miles.	...do...	Apr. 11	11.51 a.m.	162	fne. lt. gy. S.
				1.08 p.m.	156	fne. gy. S., M.
				1.19 p.m.	156–131	gy. yl. S., M., R.
				1.41 p.m.	131	yl. S., R.
D.4415	NE. point Santa Barbara Island, N. 89° W., 8.6 miles.	C. S. 5200	Apr. 11	3.02 p.m.	638	gn. M.
				3.33 p.m.	638–302	gn. M.
				4.05 p.m.	302	gn. M.
D.4416	SW. rock, Santa Barbara Island, N. 49° W., 4.7 miles.	...do...	Apr. 12	7.55 p.m.	448	dk. gn. M.
				8.17 p.m.	448–323	dk. gn. M., R.
				8.52 p.m.	323	dk. gn. M., R.
D.4417	SW. rock, Santa Barbara Island, N. 8° W., 6.3 miles.	...do...	Apr. 12	9.48 a.m.	29	fne. yl. S., Corln., R.
				9.48 a.m.	29	fne. yl. S., Corln., R.
				10.10 a.m.	29	fne. yl. S., Corln., R.
D.4418	SW. rock, Santa Barbara Island, N. 8° E., 6.9 miles.	...do...	Apr. 12	11.00 a.m.	238	gy. S.
				11.07 a.m.	238–310	dk. M., S., R.
				11.35 a.m.	310	bk. M.

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Apparatus.	Trial. Depth.	Trial. Duration.	Drift. Direction.	Drift. Distance.	Remarks.
°F.	°F.	°F.			h. m.		mi	
58	61		Sig. sdr		1 39	N. 75° W.	3.0	
58	60		8′ Tnr	Bottom.	32	N. 75° W.	1.0	
58	60	40.2	Sig. sdr			None		
63	61	40.0	Sig. sdr		1 25	N. 85° W.	2.0	
65	62		8′ Tnr	Bottom.	13	N. 85° W.	.4	Net badly torn.
67	62		Sig. sdr			None		
65	63	40.0	Sig. sdr		1 13	S. 53° W.	.7	
63	63		8′ Tnr	Bottom.	30	S. 53° W.	.4	
62	62		Sig. sdr			None		
62	62		Sig. sdr		1 53	N. 75° W.	2.5	Position same as end of preceding station.
64	62		9′ Tnr	Bottom.	34	N. 75° W.	1.0	
64	63		Sig. sdr			None		
61 55	61 60		Hand lead		11 0	None		Anchorage overnight.
61 55	61 60		3 lobster pots	Bottom.	11 0	None		Set in edge of kelp patches near anchorage.
61 55	61 60		2 small gill nets	Surface.	11 0	None		Set out from beach between 2 kelp patches. Wrecked by sea lions just prior to hauling.
56	59	39.4	Sig. sdr		1 28	N. 37° E.	2.0	
56	59		9′ Tnr	Bottom.	30	N. 37° E.	1.0	
56	60		Sig. sdr			None		
60	60		Sig. sdr		1 40	N. 37° E.	2.6	
60	60		10′ Blk	Bottom.	27	N. 37° E.	1.2	Net fouled of frame when hoisted.
58	60		Sig. sdr		1 18	S. 25° E.	1.2	
58	60		Sig. sdr			None		
58	60		9′ Tnr	Bottom.	28	S. 25° E.	.8	Net slightly torn.
59	60		Sig. sdr			None		
62	60		Sig. sdr		41	N. 82° W.	.6	
63	60		9′ Tnr	Bottom.	25	N. 82° W.	.5	
65	60		Sig. sdr			None		
65	61		Sig. sdr		39	N. 53° W.	2.3	
65	61		9′ Tnr	Bottom.	30	N. 53° W.	1.8	
64	63		Sig. sdr			None		
61	61		Sig. sdr		49	N. 16° W.	1.5	
61	61		9′ Tnr	Bottom.	25	N. 16° W.	1.0	Net slightly torn.
61	61		Sig. sdr			None		
61	61		Sig. sdr		54	N. 33° W.	1.6	
61	61		9′ Tnr	Bottom.	28	N. 33° W.	1.2	
61	61		Sig. sdr			None		
60	61		Sig. sdr		55	N. 88° W.	1.0	Bird Rock is off Isthmus Cove.
61	61		9′ Tnr	Bottom.	30	N. 88° W.	.8	
63	61		Sig. sdr			None		
64	62		Sig. sdr		40	N. 68° W.	1.5	
66	62		9′ Tnr	Bottom.	24	N. 68° W.	1.2	
68	62		Sig. sdr			None		
66	62		Sig. sdr		45	S. 25° E.	1.0	
66	62		9′ Tnr	Bottom.	23	S. 25° E.	.8	
66	62		Sig. sdr			None		
65	62		Sig. sdr		1 14	N. 12° W.	1.3	
64	62		9′ Tnr	Bottom.	28	N. 12° W.	.7	
62	61		Sig. sdr			None		
56	59		Sig. sdr		1 15	N. 76° W.	1.4	SW. rock is the rocky islet lying a short distance SW. of the island.
56	59		9′ Tnr	Bottom.	29	N. 76° W.	.9	
57	59		Sig. sdr			None		
58	59		Sig. sdr		1 0	S. 73° W.	1.3	
58	59		16 hand lines	Bottom.	43	S. 73° W.	1.2	On Osborne Bank.
58	59		8 swabs	Bottom.	21	S. 73° W.	.6	
58	58		Sig. sdr		54	S. 73° W.	.8	
58	58		9′ Tnr	Bottom.	32	S. 73° W.	.6	
58	58		Sig. sdr			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From San Diego, Cal., through Santa Catalina and Santa Barbara islands—Continued.		1904.		*fms.*	
D. 4419	E. point San Nicolas Island, S. 73° W., 8.4 miles.	C. S. 5200	Apr. 12	1.20 p. m.	238	hrd. bk. M.
				1.35 p. m.	238	bk. M., R.
D. 4420	E. point San Nicolas Island, S. 77° W., 5.7 miles.	do	Apr. 12	2.25 p. m.	33	fne. gy. S.
				2.31 p. m.	33–32	fne. gy. S.
				2.58 p. m.	32	fne. gy. S.
D. 4421	E. point San Nicolas Island, N. 26° W., 3.8 miles.	do	Apr. 12	3.37 p. m.	291	gy. M., R.
				3.54 p. m.	291–229–298	gy. M., R.
				4.03 p. m.	229	gy. M., R.
				4.26 p. m.	298	gy. M., R.
D. 4422	E. point San Nicolas Island, S. 6° W., 2.5 miles.	do	Apr. 13	7.27 a. m.	31	gy. S., Sh.
				7.31 a. m.	31–32	gy. S., Sh.
				7.54 a. m.	32	gy. S., Sh.
D. 4423	E. point San Nicolas Island, S. 7.6 miles.	do	Apr. 13	8.44 a. m.	339	gy. S., bk. P., Sh.
				9.01 a. m.	339–216	gy. S., bk. P., Sh.
				9.25 a. m.	216	gy. S., bk. P., Sh.
D. 4424	E. point San Nicolas Island, S. 13 miles.	do	Apr. 13	10.34 a. m.	594	fne. gy. S.
				11.02 a. m.	594–581	fne. gy. S.
				11.11 a. m.	581	fne. gy. S.
D. 4425	E. point San Nicolas Island, S. 7° E., 21.8 miles.	do	Apr. 13	1.25 p. m.	1,100	gn. M., fne. S., Glob
				2.02 p. m.	1,100–1,084	gn. M., fne. S., Glob
				2.33 p. m.	1,084	gn. M., fne. S., Glob
D. 4426	Point San Pedro, Santa Cruz Island, N. 17° E., 4 miles.	do	Apr. 14	7.40 a. m.	129	fne. gy. S., R.
				7.46 a. m.	129–218	fne. gy. S., R.
				8.09 a. m.	218	fne. gy. S., R.
D. 4427	Point San Pedro, Santa Cruz Island, N. 35° E., 7 miles.	do	Apr. 14	8.55 a. m.	447	bk. M., St.
				9.11 a. m.	447–510	bk. M., R.
				9.28 a. m.	510	bk. M., R.
D. 4428	Point San Pedro, Santa Cruz Island, N. 34° E., 10.3 miles.	do	Apr. 14	10.27 a. m.	764	gn. M.
				10.58 a. m.	764–891	gn. M.
				11.05 a. m.	891	gn. M.
D. 4429	Gull Islet, s. coast of Santa Cruz Island, N. 21° W., 2.9 miles.	do	Apr. 14	1.19 p. m.	506	gn. M.
				1.42 p. m.	506–680	gn. M., bk. P., Sh.
				2.05 p. m.	680	gn. M., bk. P., Sh.
D. 4430	Gull Islet, s. coast of Santa Cruz Island. N. 40° E., 2.7 miles.	do	Apr. 14	3.05 p. m.	197	bk. S., P.
				3.15 p. m.	197–281	bk. S., P., R.
				3.35 p. m.	281	bk. S., P., R.
D. 4431a	Brockway Point, Santa Rosa Island, S. 43° W., 5.2 miles.	do	Apr. 15	8.05 a. m.	41	yl. M., R.
				8.10 a. m.	41	yl. M., R.
D. 4431b	Brockway Point, Santa Rosa Island, S. 41° W., 4.6 miles.	do	Apr. 15	8.24 a. m.	41	gn. M., R.
				8.27 a. m.	41–38	gn. M., R.
D. 4431c	Brockway Point, Santa Rosa Island, S. 38° W., 4 miles.	do	Apr. 15	8.46 a. m.	38	crs.gy.S., bk.Sp., R
				8.47 a. m.	38–40	crs.gy.S., bk.Sp., R
				8.58 a. m.	40	crs.gy.S., bk.Sp., R
D. 4431d	Brockway Point, Santa Rosa Island, S. 35° W., 3.5 miles.	do	Apr. 15	9.13 a. m.	40	fne. gy. S., R.
				9.13 a. m.	40–45	gn. M., gy. S., R.
				9.27 a. m.	45	gn. M.
D. 4432	Brockway Point, Santa Rosa Island, S. 8 miles.	do	Apr. 15	10.14 a. m.	272	gn. M.
				10.29 a. m.	272–270	gn. M.
				10.46 a. m.	270	gn. M.
D. 4433	Brockway Point, Santa Rosa Island, S. 10° E., 7.5 miles.	do	Apr. 15	11.21 a. m	265	gn. M.
				11.32 a. m.	265–243	gn. M.
				11.41 a. m.	243	gn. M.
D. 4434	Harris Point, San Miguel Island, S. 21° E., 9.5 miles.	do	Apr. 15	1.14 p. m.	281	gn. M.
				1.20 p. m.	281–270	gn. M.
				1.45 p. m.	270	gn. M.
D. 4435	Harris Point, San Miguel Island, S. 13° W., 7.7 miles.	do	Apr. 15	2.19 p. m.	287	gn. M.
				2.32 p. m.	287–274	gn. M.
				2.50 p. m.	274	gn. M.
D. 4436	Harris Point, San Miguel Island, S. 7° E., 9.8 miles.	do	Apr. 15	3.44 p. m.	271	gn. M.
				3.56 p. m.	271–264	gn. M.
				4.16 p. m.	264	gn. M.
	Monterey Bay, California.					
D. 4437	Point Pinos Lt. Ho., S. 88° W., 3.2 miles.	C. S. 5498	May 10	7.46 a. m.	26	hrd. gy. S.
				7.49 a. m.	26–41	hrd. gy. S.
				8.30 a. m.	41	hrd. gy. S.
D. 4438	Point Pinos Lt. Ho., S. 62° W., 2.1 miles.	do	May 10	8.43 a. m.	41	fne. gy. S.
				8.47 a. m.	41–46	fne. gy. S.
				9.02 a. m.	46	fne. gy. S.

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.			Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.		Direction.	Distance.	
°F.	°F.	°F.			h.	m.		mi.	
62	58	......	Sig. sdr	....		20	S. 65° W	.5	E. point is the extreme eastern end of the island, and is north of the anchorage shown on chart.
62	58	......	9′ Tnr	Bottom.		7	S. 65° W	.2	Frame bent; net wrecked.
61	59	......	Sig. sdr	....		39	S. 60° W	2.8	
61	59	......	10′ Blk	Bottom.		30	S. 60° W	2.0	Strong current.
61	59	......	Tnr. sdr	....			None		
61	59	......	Sig. sdr	....		59	S. 67° E	.7	
61	59	......	10′ Blk	Bottom.		26	S. 67° E	.6	
60	59	......	Sig. sdr	....			None		
60	59	......	Sig. sdr	....			None		
64	59	......	Tnr. sdr	....		34	W	.9	
64	59	......	10′ Blk	Bottom.		26	W	.8	
64	59	......	Tnr. sdr	....			None		
66	59	......	Sig. sdr	....	1	5	S. 20° W	1.3	
67	59	......	10′ Blk	Bottom.		28	S. 20° W	.9	
67	59	......	Sig. sdr	....					
69	59	......	Sig. sdr	....	1	24	S. 55° W	1.7	
69	60	......	10′ Blk	Bottom.		26	S. 55° W	.8	
69	60	......	Sig. sdr	....			None		
68	60	......	Sig. sdr	....	2	24	S. 27° W	1.3	
65	60	......	9′ Tnr	Bottom.		32	S. 27° W	.8	
64	60	......	Sig. sdr	....			None		
70	58	......	Tnr. sdr	....		48	S. 50° W	2.3	
70	58	......	9′ Tnr	Bottom.		30	S. 50° W	1.7	
70	58	......	Sig. sdr	....			None		
68	58	......	Sig. sdr	....	1	23	S. 25° W	2.4	
68	58	......	10′ Blk	Bottom.		30	S. 25° W	1.4	
68	58	......	Sig. sdr	....			None		
65	59	......	Sig. sdr	....	1	41	S	2.5	
65	59	......	9′ Tnr	Bottom.		26	S	1.2	
64	59	......	Sig. sdr	....			None		
65	60	......	Sig. sdr	....	1	21	S. 40° W	2.0	
62	60	......	9′ Tnr	Bottom.		27	S. 40° W	1.0	Frame bent slightly.
61	59	......	Sig. sdr	....			None		
61	60	......	Sig. sdr	....		50	S. 33° W	1.3	
61	60	......	10′ Blk	Bottom.		21	S. 33° W	.7	Net wrecked.
61	60	......	Sig. sdr	....			None		
61	58	......	Tnr. sdr	....		15	S. 60° W	.6	
61	58	......	11′ Tnr	Bottom.		2	S. 60° W	.1	Inner net foul of mouth.
62	58	......	Tnr. sdr	....		15	S. 60° W	.6	Position same as end of preceding station.
62	58	......	8 swabs	Bottom.		7	S. 60° W	.4	
64	58	......	Tnr. sdr	....		17	S. 60° W	.5	Position same as end of preceding station.
64	58	......	7 swabs	Bottom.		13	S. 60° W	.4	Tangle frame bent.
65	59	......	Tnr. sdr	....			None		
66	59	......	Tnr. sdr	....		21	S. 60° W	.8	
66	59	......	8 swabs	Bottom.		16	S. 60° W	.6	
67	59	......	Tnr. sdr	....			None		
70	60	......	Sig. sdr	....	1	1	S. 69° W	1.7	
69	60	......	11′ Tnr	Bottom.		27	S. 69° W	1.1	
68	60	......	Sig. sdr	....			None		
67	60	......	Sig. sdr	....		46	N. 75° E	.5	
67	60	......	11′ Tnr	Bottom.		13	N. 75° E	.3	
66	60	......	Sig. sdr	....			None		
64	59	......	Sig. sdr	....	1	0	S. 54° W	2.0	
64	59	......	11′ Tnr	Bottom.		28	S. 54° W	1.4	Gear slightly damaged.
63	59	......	Sig. sdr	....			None		
62	59	......	Sig. sdr	....		56	S. 68° W	1.6	
62	59	......	11′ Tnr	Bottom.		24	S. 68° W	1.1	
62	59	......	Sig. sdr	....			None		
61	59	......	Sig. sdr	....	1	0	S. 67° W	1.7	
61	59	......	11′ Tnr	Bottom.		30	S. 67° W	1.0	
61	59	......	Sig. sdr	....			None		
60	57	......	Tnr. sdr	....		49	N. 60° W	1.5	
60	57	......	8′ Tnr	Bottom.		43	N. 60° W	1.3	
61	57	......	Tnr. sdr	....			None		
61	57	......	Tnr. sdr	....		27	N. 41° W	.8	
61	57	......	8′ Tnr.; m. c	Bottom.		23	N. 41° W	.7	
60	57	......	Tnr. sdr	....			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Monterey Bay, California—Continued.		1904.		*fms.*	
D. 4439	Point Pinos Lt. Ho., S. 38° W., 1.5 miles.	C. S. 5498	May 10	9.33 a.m.	42	gy. S., Sh
				9.41 a.m.	42–40	gy. S., Sh
				10.10 a.m.	40	gy. S., Sh
D. 4440	Point Pinos Lt. Ho., S. 83° W., 2.1 miles.	do	May 10	10.20 a.m.	39	gy. S., Sh
				10.24 a.m.	39–26	gy. S., Sh
				10.54 a.m.	26	gy. S., Sh
D. 4441	Point Pinos Lt. Ho., N. 87° W., 1.7 miles.	do	May 10	11.16 a.m.	35	gy. S.
				11.22 a.m.	35–28	bl. M., S., Sh
				11.39 a.m.	28	bl. M., Sh
D. 4442	Point Pinos Lt. Ho., S. 67° W., 4.6 miles.	do	May 10	1.56 p.m.	26	fne. gy. S
				1.58 p.m.	26–31	fne. gy. S
				2.24 p.m.	31	fne. gy. S
D. 4443	Point Pinos Lt. Ho., S. 69° W., 3.7 miles.	do	May 10	2.39 p.m.	32	fne. gy. S
				2.42 p.m.	32–37	fne. gy. S
				3.08 p.m.	37	fne. gy. S
D. 4444	Point Pinos Lt. Ho., S. 67° W., 2.9 miles.	do	May 10	3.22 p.m.	40	fne. gy. S
				3.23 p.m.	40–40	fne. gy. S
				3.54 p.m.	40	fne. gy. S
D. 4445	Point Pinos Lt. Ho., S. 13° E., 6 miles.	do	May 11	8.27 a.m.	66	gn. M
				8.31 a.m.	66–60	gn. M
				9.02 a.m.	60	gn. M
D. 4446	Point Pinos Lt. Ho., S. 2° W., 5 miles.	do	May 11	9.14 a.m.	59	gn. M
				9.18 a.m.	59–52	gn. M
				9.40 a.m.	52	gn. M
				9.45 a.m.	52	gn. M
				9.49 a.m.	52	gn. M
D. 4447	Point Pinos Lt. Ho., S. 21° W., 4.5 miles.	do	May 11	10.03 a.m.	52	gn. M
				10.03 a.m.	52–42	gn. M
				10.07 a.m.	52–42	gn. M
				10.40 a.m.	42	gn. M
D. 4448	Point Pinos Lt. Ho., S. 41° W., 4.8 miles.	do	May 11	10.50 a.m.	45	gn. M
				10.50 a.m.	45–34	gn. M
				11.20 a.m.	34	gn. M
D. 4449	Point Pinos Lt. Ho., S. 58° W., 5.2 miles.	do	May 11	11.26 a.m.	29	gn. M
				11.29 a.m.	29–22	gn. M., S
				11.40 a.m.	22	gy. S
D. 4450	Point Pinos Lt. Ho., S. 8° E., 3.9 miles.	do	May 11	1.31 p.m.	60	dk. gn. M
				1.37 p.m.	60–55	dk. gn. M
				1.44 p.m.	60–55	dk. gn. M
				2.07 p.m.	55	dk. gn. M
D. 4451	Point Pinos Lt. Ho., S. 23° W., 3.2 miles.	do	May 11	2.19 p.m.	52	gn. M., S
				2.23 p.m.	52–47	gn. M., S
				2.26 p.m.	52–47	gn. M., S
				2.48 p.m.	47	gn. M., S
D. 4452	Point Pinos Lt. Ho., S. 21° W., 3.4 miles.	do	May 11	3.29 p.m.	49	gn. M., fne. S
				3.36 p.m.	49–50	gn. M., fne. S
				4.00 p.m.	50	gn. M., fne. S
D. 4453	Point Pinos Lt. Ho., S. 17° W., 2.3 miles.	do	May 11	4.15 p.m.	49	dk. gn. M
				4.21 p.m.	49–51	dk. gn. M
				4.45 p.m.	51	dk. gn. M
D. 4454	Point Pinos Lt. Ho., S. 13° E., 8.3 miles.	do	May 12	8.46 a.m.	71	gn. M., S
				8.46 a.m.	71–65	gn. M., S., G
				8.53 a.m.	65	gn. M., G
D. 4455	Point Pinos Lt. Ho., S. 6° E., 7.6 miles.	do	May 12	9.05 a.m.	62	gn. M
				9.11 a.m.	62–56	gn. M
				9.40 a.m.	56	gn. M
D. 4456	Point Pinos Lt. Ho., S. 10° W., 6.9 miles.	do	May 12	9.50 a.m.	55	gn. M
				9.54 a.m.	55–49	gn. M
				10.17 a.m.	49	gn. M
D. 4457	Point Pinos Lt. Ho., S. 21° W., 6.1 miles.	do	May 12	10.34 a.m.	46	dk. gn. M
				10.38 a.m.	46–40	dk. gn. M
				10.53 a.m.	46–40	dk. gn. M
				11.07 a.m.	40	dk. gn. M
D. 4458	Point Pinos Lt. Ho., S. 35° W., 6 miles.	do	May 12	11.28 a.m.	37	dk. gn. M., fne. S., bk. Sp.
				11.32 a.m.	37–32	dk. gn. M., fne. S., bk. Sp.
				11.46 a.m.	32	dk. gn. M., fne. S., bk. Sp.
D. 4459	Point Pinos Lt. Ho., S. 42° W., 7.6 miles.	do	May 12	1.32 p.m.	13	fne. gy. S
				1.32 p.m.	13–15	fne. gy. S
				1.37 p.m.	15	fne. gy. S

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
58	58	......	Tnr. sdr	....	41	S. 48° E	1.3	
57	58	......	8′ Tnr.; m. c	Bottom.	30	S. 48° E	1.0	
56	58	......	Tnr. sdr			None		
56	57	......	Tnr. sdr	....	37	S. 49° E	1.1	
56	57	......	8 Tnr.; m. c	Bottom.	30	S. 49° E	1.0	
56	57	......	Tnr. sdr			None		
56	57	......	Tnr. sdr	....	29	S. 50° E	.8	
56	57	......	8′ Tnr.; m. b	Bottom.	21	S. 50° E	.7	
57	57	......	Tnr. sdr			None	......	
64	58	......	Tnr. sdr	....	36	S. 58° W	.7	
64	58	......	11′ Tnr.; m. b	Bottom.	30	S. 58° W	.6	
63	58	......	Tnr. sdr			None		
62	58	48.0	Tnr. sdr	....	35	S. 59° W	.7	
61	59	......	11′ Tnr.; m. b	Bottom.	27	S. 59° W	.6	
60	59	48.0	Tnr. sdr			None		
60	59	48.0	Tnr. sdr	....	37	{N. 10° W {N. 62° E	.4 .6	
60	59	......	11′ Tnr.; m. b	Bottom.	32	{N. 10° W {N. 62° E	.3 .5	
60	59	48.0	Tnr. sdr			None		
56	57	46.5	Tnr. sdr	....	39	S. 62° E	1.5	
56	57	......	11′ Tnr.; m. b	Bottom.	30	S. 62° E	1.3	
54	57	47.7	Tnr. sdr			None		
53	58	47.7	Tnr. sdr	....	39	S. 62° E	1.4	
53	58	......	11′ Tnr.; m. b	Bottom.	31	S. 62° E	1.2	
53	58	......	Tnr. sdr	....	....	None	......	
52	58	......	Surf. tow	Surface .	12	S. 62° E	.5	
52	58	47.2	Tnr. sdr			None		
52	59	47.5	Tnr. sdr	....	38	S. 68° E	1.4	
52	59	......	Surf. tow	Surface .	30	S. 68° E	1.3	3 hauls (10 minutes each) between 10.03 and 10.43 a. m.
52	59	......	11′ Tnr.; m. b	Bottom.	30	S. 68° E	1.3	
52	58	47.9	Tnr. sdr			None		
53	58	47.9	Tnr. sdr	....	30	S. 54° E	1.2	
53	58	......	11′ Tnr.; m. c	Bottom.	27	S. 54° E	1.1	
53	57	48.0	Tnr. sdr			None		
53	57	49.0	Tnr. sdr	....	17	S. 56° E	.4	
53	57	......	11′ Tnr	Bottom.	11	S. 56° E	.3	
53	57	......	Tnr. sdr			None		
55	57	48.0	Tnr. sdr			S. 63° E	1.4	
55	57	......	11′ Tnr	Bottom.	30	S. 63° E	1.2	
54	57	......	Surf. tow	Surface .	20	S. 63° E	.8	
53	57	48.0	Tnr. sdr	....	....	None	......	
53	57	48.2	Tnr. sdr	....	37	S. 64° E	1.3	
53	57	......	11′ Tnr	Bottom.	29	S. 64° E	1.1	
53	57	......	Surf. tow	Surface .	10	S. 64° E	.4	
55	56	48.5	Tnr. sdr			None		
56	54	47.8	Tnr. sdr	....	38	S. 25° W	.8	
56	54	......	10′ Blk.; m. c	Bottom.	27	S. 25° W	.6	
56	54	48.5	Tnr. sdr			None		
56	54	48.5	Tnr. sdr	....	38	S. 58° W	.8	
56	54	......	10′ Blk.; m. c	Bottom.	28	S. 58° W	.6	
56	54	49.0	Tnr. sdr	....	....	None	......	
55	54	......	Tnr. sdr	....	23	S. 67° E	.7	
55	54	......	10′ Blk	Bottom.	9	S. 67° E	.3	Net badly torn.
55	54	......	Tnr. sdr			None		
55	54	48.0	Tnr. sdr		41	S. 67° E	1.7	
55	54	......	11′ Tnr	Bottom.	28	S. 67° E	1.4	
55	54	......	Tnr. sdr	....	....	None	......	Whale fouled sounding gear, carrying it afoul of propeller and parting wire.
54	53	......	Tnr. sdr	....	37	S. 38° E	1.0	
54	53	......	11′ Tnr	Bottom.	29	S. 38° E	.9	
54	53	......	Tnr. sdr			None		
54	53	......	Tnr. sdr		36	SE	.7	
54	53	......	10′ Blk	Bottom.	30	SE	.6	Net torn by weight of mud.
55	54	......	Surf. tow	Surface .	10	SE	.2	
56	54	......	Tnr. sdr			None		
56	54	......	Tnr. sdr	....	26	SE	.8	
56	54	......	11′ Tnr	Bottom.	19	SE	.6	
56	54	......	Tnr. sdr			None		
59	55	......	Tnr. sdr	....	11	N. 39° W	.4	
59	55	......	10′ Blk	Bottom.	8	N. 39° W	.3	
59	55	......	Tnr. sdr	....	....	None	......	

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Monterey Bay, California—Continued.					
			1904.		*fms.*	
D. 4460	Point Pinos Lt. Ho., S. 12° E., 10.8 miles.	C. S. 5498	May 12	2.55 p. m.	55	gn. M., G
				3.00 p. m.	55–67+	gn. M., G
				3.07 p. m.	67–167	gn. M., G
				3.09 p. m.	67	gn. M., G
				3.19 p. m.	167	gn. M., G
D. 4461	Point Pinos Lt. Ho., S. 3° E., 9.3 miles.	do	May 12	3.37 p. m.	285	gn. M
				3.55 p. m.	285–323–357	gn. M
				4.09 p. m.	323	gn. M
				4.24 p. m.	357	gn. M
D. 4462	Point Pinos Lt. Ho., S. 5° W., 8.5 miles.	do	May 13	8.41 a. m.	313	gn. M
				8.55 a. m.	265	gn. M
				8.59 a. m.	265–161	gn. M
				9.05 a. m.	161	gy. M
D. 4463	Point Pinos Lt. Ho., S. 17° W., 8 miles.	do	May 13	9.30 a. m.	111	rky
				9.37 a. m.	111–48	rky
				9.40 a. m.	48	rky
D. 4464	Point Pinos Lt. Ho., S. 20° W., 7.8 miles.	do	May 13	10.05 a. m.	51	sft. dk. gy. M
				10.09 a. m.	51–36	sft. dk. gy. M
				10.40 a. m.	36	sft. dk. gy. M
D. 4465	Point Pinos Lt. Ho., S. 29° W., 7.6 miles.	do	May 13	10.53 a. m.	31	hrd. gy. S
				10.56 a. m.	31–21	hrd. gy. S
				11.23 a. m.	21	hrd. gy. S
D. 4466	Santa Cruz Lt. Ho., N. 19° W., 7 miles.	do	May 13	2.05 p. m.	86	gn. M., R
				2.13 p. m.	194	gn. M., R
				2.18 p. m.	74	gn. M., R
				2.18 p. m.	74–50	gn. M., R
				2.30 p. m.	50	gn. M., R
D. 4467	Santa Cruz Lt. Ho., N. 28° W., 8.8 miles.	do	May 13	2.39 p. m.	54	sft. dk. gn. M
				2.47 p. m.	54–51	sft. dk. gn. M
				3.07 p. m.	51	sft. dk. gn. M
D. 4468	Santa Cruz Lt. Ho., N. 32° W., 10.3 miles.	do	May 13	3.16 p. m.	51	fne. S
				3.21 p. m.	51–309–32	fne. S
				3.34 p. m.	309	fne. S
				3.52 p. m.	32	fne. S
D. 4469	Point Pinos Lt. Ho., S. 3° E., 1.9 miles.	do	May 14	7.40 a. m.	54	hrd. gy. S
				7.45 a. m.	54–63	hrd. gy. S
				8.17 a. m.	63	hrd. gy. S
D. 4470	Point Pinos Lt. Ho., S. E., 2.8 miles.	do	May 14	8.29 a. m.	61	hrd. gy. S
				8.33 a. m.	61–69	hrd. gy. S
				8.46 a. m.	69	hrd. gy. S
D. 4471	Point Pinos Lt. Ho., S. 33° E., 5.3 miles.	do	May 14	9.31 a. m.	303	hrd. gy., S
				9.43 a. m.	144	hrd. gy., S
				9.43 a. m.	144–65	gy. S., R
				10.05 a. m.	65	gy., S
D. 4472	Point Pinos Lt. Ho., S. 29° E., 3.6 miles.	do	May 14	10.17 a. m.	65	hrd. S
				10.23 a. m.	65–71–59	hrd. S
				10.26 a. m.	71	hrd. S
				10.38 a. m.	59	hrd. S
D. 4473	Point Pinos Lt. Ho., S. 15° E., 2.8 miles.	do	May 14	10.54 a. m.	59	gy. S., M
				10.59 a. m.	59–65–54	gy. S., M
				11.09 a. m.	65	gy. S., M
				11.17 a. m.	54	gy. S., M
D. 4474	Point Pinos Lt. Ho., S. 34° W., 1.2 miles.	do	May 14	11.35 a. m.	43	hrd. S., M
				11.42 a. m.	43–34	hrd. S., M
				11.53 a. m.	34	hrd. S., M
D. 4475	Point Pinos Lt. Ho., S. 15° W., 9.7 miles.	do	May 16	8.44 a. m.	142	sft. gn. M
				8.50 a. m.	85	sft. gn. M
				8.50 a. m.	85–58	sft. gn. M
				9.06 a. m.	58	sft. gn. M
D. 4476	Point Pinos Lt. Ho., S. 22° W., 9.4 miles.	do	May 16	9.50 a. m.	39	sft. gn. M
				9.55 a. m.	39–25	sft. gn. M
				10.15 a. m.	25	sft. gn. M
D. 4477	Point Pinos Lt. Ho., S. 31° W., 9.2 miles.	do	May 16	10.29 a. m.	19	sft. gn. M
				10.30 a. m.	19–11	sft. gn. M
				10.50 a. m.	11	sft. gn. M
D. 4478	Santa Cruz Lt. Ho., N. 13° W., 3.8 miles.	do	May 16	1.41 p. m.	30	hrd. S
				1.46 p. m.	30–30	hrd. S
				2.03 p. m.	30	hrd. S
D. 4479	Santa Cruz Lt. Ho., N. 25° W., 5.1 miles.	do	May 16	2.14 p. m.	33	hrd. S
				2.19 p. m.	33–45	hrd. S
				2.36 p. m.	45	hrd. S

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°*F.*	°*F.*	°*F.*			*h. m.*		*mi.*	
58	56	......	Tnr. sdr........	....	30	S. 54° E...	1.2	
58	56	......	10′ Blk..........	Bottom.	20(?)	S. 54° E...	.8	Probably not on bottom all the time.
58	56	......	Surf. tow........	Surface.	11	S. 54° E...	.3	
58	56	......	Tnr. sdr........	....	....	None......	......	
58	56	......	Tnr. sdr........	....	....	None......	......	
58	56	......	Sig. sdr........	....	1 9	S. 65° E...	1.5	
59	56	......	10′ Blk..........	Bottom.	29	S. 65° E...	1.0	
59	55	......	Sig. sdr........	....	....	None......	......	
59	55	......	Sig. sdr........	....	....	None......	......	
55	53	......	Sig. sdr........	....	40	S. 65° E...	1.2	
55	53	44.4	Sig. sdr........	....	....	None......	......	
55	53	......	10′ Blk..........	Bottom.	6	S. 65° E...	.5	Net wrecked.
55	53	......	Sig. sdr........	....	....	None......	......	
55	53	......	Sig. sdr........	....	20	S. 68° E...	.2	
55	53	......	11′ Tnr..........	Bottom.	4	S. 68° E...	.1	Net torn slightly; large rock brought up.
55	53	......	Sig. sdr........	....	....	None......	......	
54	53	......	Sig. sdr........	....	36	S. 56° E...	.8	
54	53	......	8′ Tnr..........	Bottom.	30	S. 56° E...	.7	
54	53	49.5	Sig. sdr........	....	....	None......	......	
54	53	......	Sig. sdr........	....	35	S. 59° E...	1.0	
54	53	......	8′ Tnr..........	Bottom.	30	S. 59° E...	.9	
54	53	......	Sig. sdr........	....	....	None......	......	
57	54	......	Tnr. sdr........	....	31	S. 55° E...	1.5	
57	54	......	Tnr. sdr........	....	....	None......	......	
57	54	......	Tnr. sdr........	....	....	None......	......	
57	54	......	8′ Tnr..........	Bottom.	15	S. 55° E...	1.0	
57	54	......	Tnr. sdr........	....	....	None......	......	
57	54	41.0	Tnr. sdr........	....	28	S. 57° E...	1.0	
57	54	......	8′ Tnr..........	Bottom.	15	S. 57° E...	.7	
57	54	......	Tnr. sdr........	....	....	None......	......	
57	54	......	Tnr. sdr........	....	51	SE.......	2.0	
57	54	......	8′ Tnr..........	Bottom.	30	SE.......	1.7	Probably not on bottom all of time.
57	54	......	Sig. sdr........	....	....	None......	......	
57	54	44.5	Sig. sdr........	....	....	None......	......	
53	53	......	Sig. sdr........	....	42	N. 81° W..	1.4	
53	53	......	8′ Tnr..........	Bottom.	32	N. 81° W..	1.3	
53	53	......	Sig. sdr........	....	....	None......	......	
53	53	......	Sig. sdr........	....	28	S. 68° W..	.8	
53	53	......	8′ Tnr..........	Bottom.	19	S. 68° W..	.6	
53	53	......	Sig. sdr........	....	....	None......	......	
54	53	......	Sig. sdr........	....	34	S. 42° E...	1.0	
54	53	......	Sig. sdr........	....	....	None......	......	
54	53	......	8′ Tnr..........	Bottom.	18	S. 42° E...	.6	
55	53	......	Sig. sdr........	....	....	None......	......	
55	53	......	Sig. sdr........	....	32	S. 61° E...	1.0	
55	53	......	10′ Blk..........	Bottom.	20	S. 61° E...	.8	
55	53	......	Sig. sdr........	....	....	None......	......	
55	54	......	Sig. sdr........	....	....	None......	......	
55	55	......	Sig. sdr........	....	29	S. 55° E...	.9	
55	55	......	10′ Blk..........	Bottom.	19	S. 55° E...	.7	
55	55	......	Sig. sdr........	....	....	None......	......	
55	55	......	....	....	....	None......	......	
54	55	......	Sig. sdr........	....	25	S. 42° E...	.9	
54	54	......	10′ Blk..........	Bottom.	15	S. 42° E...	.7	
53	54	......	Sig. sdr........	....	....	None......	......	
56	55	......	Sig. sdr........	....	27	S. 58° E...	.9	
56	55	......	Sig. sdr........	....	....	None......	......	
56	55	......	10′ Blk..........	Bottom.	15	S. 58° E...	.6	Net slightly torn from weight of mud.
55	55	......	Sig. sdr........	....	....	None......	......	
54	55	......	Sig. sdr........	....	32	S. 57° E...	1.1	
54	55	......	10′ Blk..........	Bottom.	25	S. 57° E...	.9	
54	55	......	Sig. sdr........	....	....	None......	......	
54	55	......	Sig. sdr........	....	26	S. 43° E...	.8	
54	55	......	10′ Blk..........	Bottom.	23	S. 43° E...	.7	
53	55	......	Sig. sdr........	....	....	None......	......	
56	54	......	Sig. sdr........	....	29	S. 53° E...	1.2	
56	54	......	10′ Blk..........	Bottom.	21	S. 53° E...	1.1	
55	54	......	Sig. sdr........	....	....	None......	......	
55	54	......	Sig. sdr........	....	29	S. 54° E...	.8	
55	54	......	10′ Blk..........	Bottom.	20	S. 54° E...	.7	
55	54	......	Sig. sdr........	....	....	None......	......	

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Monterey Bay, California—Continued.		1904.		*fms.*	
D. 4480	Santa Cruz Lt. Ho., N. 31° W., 6.1 miles.	C. S. 5498	May 16	2.56 p. m.	76	dk. gn. M., S.
				2.59 p. m.	76–53	dk. gn. M., S.
				3.15 p. m.	53	dk. gn. M., S.
D. 4481	Santa Cruz Lt. Ho., N. 37° W., 7.5 miles.	do	May 16	3.27 p. m.	50	hrd. S.
				3.34 p. m.	50–45	hrd. S.
				3.44 p. m.	45	hrd. S.
D. 4482	Santa Cruz Lt. Ho., N. 39° W., 8.7 miles.	do	May 17	8.25 a. m.	43	sft. gn. M.
				8.27 a. m.	43–44	sft. gn. M.
				8.48 a. m.	44	sft. gn. M.
D. 4483	Santa Cruz Lt. Ho., N. 41° W., 9.5 miles.	do	May 17	9.10 a. m.	45	sft. gn. M.
				9.15 a. m.	45–44	sft. gn. M.
				9.30 a. m.	44	sft. gn. M.
D. 4484	Santa Cruz Lt. Ho., N. 43° W. 10.8 miles.	do	May 17	9.47 a. m.	45	gn. M., S.
				9. 50 a. m.	45–109	gn. M., S.
				10.12 a. m.	109	gn. M., S.
D. 4485	Santa Cruz Lt. Ho., N. 44° W., 12.1 miles.	do	May 17	10.18 a. m.	108	sft. gn. M., S.
				10.25 a. m.	108–39	sft. gn. M., S.
				10.43 a. m.	39	sft. gn. M., S.
D. 4486	Santa Cruz Lt. Ho., N. 7° E., 1.1 miles.	do	May 17	2.10 p. m.	16	hrd. gy. S.
				2.14 p. m.	16–17	hrd. gy. S., R.
				2.42 p. m.	17	hrd. gy. S., R.
D. 4487	Santa Cruz Lt. Ho., N. 24° W., 1.6 miles.	do	May 17	3.06 p. m.	18	hrd. gy. S.
				3.11 p. m.	18–19	hrd. gy. S.
				3.29 p. m.	19	hrd. gy. S.
D. 4488	Santa Cruz Lt. Ho., N. 34° W., 2.5 miles.	do	May 17	3.39 p. m.	20	fne. gy. S.
				3.42 p. m.	20–22	fne. gy. S.
				3.58 p. m.	22	fne. gy. S.
D. 4489	Santa Cruz Lt. Ho., N. 42° W., 3.7 miles.	do	May 18	7.35 a. m.	20	dk. gy. S.
				7.41 a. m.	20–18	dk. gy. S.
				7.50 a. m.	18	dk. gy. S.
D. 4490	Santa Cruz Lt. Ho., N. 47° W., 4.4 miles.	do	May 18	8.06 a. m.	20	hrd. fne. gy. S.
				8.10 a. m.	20–16	hrd. fne. gy. S.
				8.33 a. m.	16	hrd. fne. gy. S.
D. 4491	Santa Cruz Lt. Ho., N. 51° W., 5.8 miles.	do	May 18	8.55 a. m.	20	hrd. gn. S.
				8.57 a. m.	20–23	hrd. gn. S.
				9.18 a. m.	23	hrd. gn. S.
D. 4492	Santa Cruz Lt. Ho., N. 54° W., 7 miles.	do	May 18	9.32 a. m.	26	sft. gn. M.
				9.35 a. m.	26–27	sft. gn. M., R.
				9.53 a. m.	27	sft. gn. M.
D. 4493	Santa Cruz Lt. Ho., N. 51° W., 8.5 miles.	do	May 18	10.06 a. m.	29	sft. gn. M.
				10.19 a. m.	29–29	sft. gn. M.
				10.36 a. m.	29	sft. gn. M.
D. 4494	Santa Cruz Lt. Ho., N. 51° W., 10.1 miles.	do	May 18	10.52 a. m.	27	hrd. S.
				10.54 a. m.	27–24	hrd. S.
				11.15 a. m.	24	hrd. S.
D. 4495	Santa Cruz Lt. Ho., N. 52° W., 11.5 miles.	do	May 18	11.23 a. m.	23	hrd. S.
				11.27 a. m.	23–19	hrd. S.
				11.43 a. m.	19	hrd. S.
D. 4496	Santa Cruz Lt. Ho. N. 80° W., 2.1 miles.	do	May 19	7.37 a. m.	10	fne. gy. S., R.
				7.39 a. m.	10–10	fne. gy. S., R.
				7.43 a. m.	10	fne. gy. S., R.
D. 4497	Santa Cruz Lt. Ho., N. 76° W., 2.6 miles.	do	May 19	8.03 a. m.	11	gy. S., R.
				8.04 a. m.	11–14	gy. S., R.
				8.32 a. m.	14	gy. S., R.
D. 4498	Santa Cruz Lt. Ho., N. 71° W., 3.7 miles.	do	May 19	8.47 a. m.	16	gy. S., M.
				8.49 a. m.	16–15	gy. S., M.
				9.08 a. m.	15	gy. S., M.
D. 4499	Santa Cruz Lt. Ho., N. 68° W., 5 miles.	do	May 19	9.16 a. m.	15	hrd. S.
				9.17 a. m.	15–14	hrd. S.
				9.37 a. m.	14	hrd. S.
D. 4500	Santa Cruz Lt. Ho., N. 67° W., 6.3 miles.	do	May 19	9.46 a. m.	14	hrd. fne. gy. S.
				9.49 a. m.	14–12	hrd. fne. gy. S.
				10.08 a. m.	12	hrd. fne. gy. S.
D. 4501	Santa Cruz Lt. Ho., N. 66° W., 7.6 miles.	do	May 19	10.17 a. m.	12	hrd. crs. S.
				10.18 a. m.	12–11	hrd. crs. S.
				10.37 a. m.	11	hrd. crs. S.
D. 4502	Santa Cruz Lt. Ho., N. 65° W., 8.9 miles.	do	May 19	10.47 a. m.	11	hrd. S.
				10.49 a. m.	11–9	hrd. S.
				11.12 a. m.	9	hrd. S.

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Apparatus.	Trial. Depth.	Trial. Duration.	Drift. Direction.	Drift. Distance.	Remarks.
°F.	°F.	°F.			h. m.		mi.	
54	54	......	Sig. sdr		36	S. 57° E	1.2	
54	54	......	10′ Blk	Bottom.	20	S. 57° E	.9	
54	54	......	Sig. sdr			None		
54	54	......	Sig. sdr		27	SE	1.1	
55	55	......	10′ Blk	Bottom.	15	SE	.8	
55	55	......	Sig. sdr			None		
51	53	......	Sig. sdr		30	S. 56° E	.6	
51	53	......	10′ Blk	Bottom.	21	S. 56° E	.5	
52	53	......	Sig. sdr			None		
53	54	......	Sig. sdr		29	S. 58° E	1.0	
53	54	......	10′ Blk	Bottom.	21	S. 58° E	.8	
53	54	......	Sig. sdr			None		
52	54	......	Sig. sdr		25	S. 57° E	1.0	
52	54	......	10′ Blk	Bottom.	20	S. 57° E	.8	
52	54	......	Sig. sdr			None		
52	54	......	Sig. sdr		35	S. 57° E	1.0	
52	54	......	10′ Blk	Bottom.	16	S. 57° E	.7	Net wrecked from weight of mud.
53	54	......	Sig. sdr			None		
57	56	......	Sig. sdr		43	S. 66° E	.6	
57	56	......	10′ Blk	Bottom.	31	S. 66° E	.5	Net badly torn.
57	56	......	Sig. sdr			None		
56	56	......	Sig. sdr		29	S. 53° E	.7	
56	56	......	8′ Tnr	Bottom.	21	S. 53° E	.6	
56	56	......	Sig. sdr			None		
56	56	......	Sig. sdr		25	S. 60° E	1.2	
56	56	......	8′ Tnr	Bottom.	20	S. 60° E	1.1	
56	56	......	Sig. sdr			None		
57	55	......	Tnr. sdr		24	S. 62° E	.5	
57	55	......	16′ Tnr	Bottom.	16	S. 62° E	.4	
56	55	......	Tnr. sdr			None		
55	55	......	Tnr. sdr		41	S. 63° E	1.2	
55	55	......	16′ Tnr	Bottom.	34	S. 63° E	1.1	
55	55	......	Tnr. sdr			None		
54	54	......	Tnr. sdr		26	S. 56° E	1.0	
54	54	......	16′ Tnr.; 1 wng.	Bottom.	22	S. 56° E	.9	Wing net 16 inches diameter.
54	54	......	Tnr. sdr			None		
54	54	......	Tnr. sdr		26	S. 20° E	1.4	
54	54	......	16′ Tnr.; 1 wng.	Bottom.	20	S. 20° E	1.3	Wing net buried in mud and wrecked. Large rock brought up in trawl net.
54	54	......	Tnr. sdr			None		
55	54	......	Tnr. sdr		37	S. 55° E	1.1	
55	54	......	16′ Tnr	Bottom.	21	S. 55° E	1.0	
55	54	......	Tnr. sdr			None		
53	54	......	Tnr. sdr		27	S. 57° E	1.0	
53	54	......	16′ Tnr	Bottom.	20	S. 57° E	.9	
53	54	......	Tnr. sdr			None		
53	54	......	Tnr. sdr		26	S. 55° E	1.1	
53	54	......	16′ Tnr	Bottom.	19	S. 55° E	1.0	
53	54	......	Tnr. sdr			None		
52	54	......	Tnr. sdr		13	S. 60° E	.3	
52	54	......	16′ Tnr	Bottom.	5	S. 60° E	.3	Net and frame badly damaged. Large piece fossil rock brought up.
52	54	......	Tnr. sdr			None		
53	53	......	Tnr. sdr		33	S. 60° E	1.0	
53	53	......	10′ Blk	Bottom.	31	S. 60° E	.9	Net slightly torn.
53	53	......	Tnr. sdr			None		
53	53	......	Tnr. sdr		24	S. 61° E	1.0	
53	53	......	8′ Tnr	Bottom.	20	S. 61° E	.9	
53	53	......	Tnr. sdr			None		
53	53	......	Tnr. sdr		21	S. 60° E	1.0	
53	53	......	8′ Tnr	Bottom.	20	S. 60° E	.9	
53	53	......	Tnr. sdr			None		
52	54	......	Tnr. sdr		25	S. 60° E	1.0	
52	54	......	8′ Tnr.; 2 wng.	Bottom.	20	S. 60° E	.9	Wing nets, 12 inches diameter.
52	55	......	Tnr. sdr			None		
52	55	......	Tnr. sdr		23	S. 61° E	1.0	
52	55	......	8′ Tnr.; 2 swabs; 2 wng.	Bottom	20	S. 61° E	.9	Swabs lashed to tail of trawl net; wing nets secured inside top of runner.
53	55	......	Tnr. sdr			None		
54	55	......	Tnr. sdr		26	S. 60° E	1.0	
54	55	......	8′ Tnr.; 2 swabs; 2 wng.	Bottom.	22	S. 60° E	.9	
54	55	......	Tnr. sdr			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Monterey Bay, California—Continued.		1904.		*fms.*	
D. 4503	Santa Cruz Lt. Ho., S. 81° W., 3.8 miles.	C. S. 5498	May 19	1.01 p. m.	7	gy. S
				1.06 p. m.	7–8	gy. S
				1.10 p. m.	8–8	gy. S
				1.21 p. m.	8	gy. S
D. 4504	Santa Cruz Lt. Ho., S. 89° W., 4.6 miles.	do	May 19	1.39 p. m.	10	hrd. gy. S
				1.39 p. m.	10–10	hrd. gy. S
				1.40 p. m.	10–10	hrd. gy. S
				1.51 p. m.	10	hrd. gy. S
D. 4505	Santa Cruz Lt. Ho., N. 85° W., 5.8 miles.	do	May 19	2.00 p. m.	10	hrd. gy. S
				2.00 p. m.	10–10	hrd. gy. S
				2.04 p. m.	10–10	hrd. gy. S
				2.22 p. m.	10	hrd. gy. S
D. 4506	Santa Cruz Lt. Ho., N. 81° W., 6.9 miles.	do	May 19	2.36 p. m.	9	hrd. gy. S
				2.36 p. m.	9–8	hrd. gy. S
				2.40 p. m.	9–8	hrd. gy. S
				2.57 p. m.	8	hrd. gy. S
D. 4507	Point Pinos Lt. Ho., S. 13° E., 8.7 miles.	do	May 20	9.02 a. m.	308	gn. M
				9.02 a. m.	308–383	gn. M
				9.29 a. m.	383	gn. M
				9.30 a. m.	383–347	gn. M
				9.46 a. m.	383–347	gn. M
				9.51 a. m.	383–347	gn. M
				10.02 a. m.	347	gn. M
				10.18 a. m.	347	gn. M
				10.18 a. m.	347	gn. M
				10.18 a. m.	347	gn. M
D. 4508	Point Pinos Lt. Ho., S. 4° E., 8.7 miles.	do	May 20	10.46 a. m.	356	sft. gn. M
				10.54 a. m.	356–292–303	sft. gn. M
				10.55 a. m.	356–292–303	sft. gn. M
				11.02 a. m.	292	sft. gn. M
				11.08 a. m.	292–303	sft. gn. M
				11.20 a. m.	303	sft. gn. M
D. 4509	Point Pinos Lt. Ho., S. 13° W., 8.6 miles.	do	May 20	1.06 p. m.	286	gn. M
				1.25 p. m	286–152	sft. gy. M
				1.28 p. m.	286–152	sft. gy. M
				1.30 p. m.	152	sft. gy. M
D. 4510	Point Pinos Lt. Ho., S. 15° W., 9.3 miles.	do	May 20	2.25 p. m.	184	gy. M
				2.35 p. m.	156	gy. M
				2.39 p. m.	156–91	gy. M
				2.48 p. m.	91	gy. M
D. 4511	Point Pinos Lt. Ho., S. 13° W., 9.3 miles.	do	May 20	3.32 p. m.	130	hrd. gn. M
				3.45 p. m.	130–155	hrd. gn. M
				3.52 p. m.	155	hrd. gn. M
D. 4512	Point Pinos Lt. Ho., S. 23° E., 9 miles.	do	May 23	9.16 a. m.	469	hrd. gn. M
				9.45 a. m.	469–530–334	hrd. gn. M
				10.00 a. m.	530	hrd. gn. M
				10.28 a. m.	309	hrd. gn. M
				10.28 a. m.	309	hrd. gn. M
				10.28 a. m.	309	hrd. gn. M
				10.31 a. m.	309	hrd. gn. M
D. 4513	Point Pinos Lt. Ho., S. 31° E., 9.3 miles.	do	May 23	11.09 a. m.	456	gn. M
				11.28 a. m.	456–389–413	gn. M
				11.30 a. m.	389	gn. M
				11.44 a. m.	413	gn. M
				12.00 m.	413	gn. M
				12.00 m.	413	gn. M
				12.00 m.	413	gn. M

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F			h. m.		mi.	
63	57	......	Tnr. sdr		30	S. 56° E	.8	
63	57	......	8′ Tnr.; 2 swabs; 2 wng.	Bottom.	22	S. 56° E	.7	Frame of beam trawl bent; net torn; wing net 12 inches diameter; 1 net 6 inches diameter.
63	57	......	Op. plank	Surface	22	S. 56° E	.7	2 small plankton nets towed separately for a total of 22 minutes between 1.10 and 1.31 p. m.
63	57	......	Tnr. sdr			None		
62	57	......	Tnr. sdr		16	S. 64° E	1.0	
62	57	......	Op. plank	Surface	13	S. 64° E	.9	2 hauls between 1.39 and 1.47 p. m.
62	57	......	8′ Tnr.; 2 swabs; 2 wng.	Bottom.	14	S. 64° E	.9	
61	57	......	Tnr. sdr			None		
59	57	......	Tnr. sdr		26	S. 61° E	.8	
59	57	......	Op. plank	Surface	20	S. 61° E	.7	2 hauls (10 minutes each) between 2 and 2.25 p. m.
59	57	......	16′ Tnr.; 2 wng.	Bottom.	21	S. 61° E	.7	
59	57	......	Tnr. sdr			None		
58	57	......	Tnr. sdr			S. 49° E	.7	
58	57	......	Op. plank	Surface	20	S. 49° E	.6	2 hauls (10 minutes each) between 2.36 and 2.59 p. m.
58	56	......	16′ Tnr.; 2 wng.	Bottom.	19	S. 49° E	.6	
57	56	......	Tnr. sdr			None		
53	53	......	Sig. sdr		1 39	N. 79° E	1.0	
53	53	......	Surf. tow	Surface	33	N. 79° E	.7	Found silk lining cut from net.
53	53	......	Sig. sdr			None		
53	53	......	10′ Blk.; 2 wng.	Bottom.	30	N. 79° E	.6	
52	53	......	Surf. tow	Surface	26	N. 79° E	.5	
52	53	......	Surf. tow and op. plank.	Surface	10	N. 79° E	.2	Small plankton net secured in mouth of surface net.
51	54	44.9	Sig. sdr			None		
51	54	44.9	Op. plank. ‖	100 fms.	4	None		Hauled simultaneously on same line.
51	54	44.9	Op. plank. ‖	200 fms.	14	None		
51	54	44.9	Op. plank. ‖	300 fms.	23	None		
51	53	......	Sig. sdr		1 8	N. 79° E	1.2	
51	53	......	Surf. tow	Surface	40	N. 79° E	1.2	
51	53	......	Op. plank	Surface	36	N. 79° E	1.0	
51	53	......	Sig. sdr			None		
51	53	......	10′ Blk.; 1 swab; 2 wng.	Bottom.	23	N. 79° E	.7	Trawl net torn badly; wing nets full of mud.
51	53	44.9	Sig. sdr			None		
57	55	......	Sig. sdr		52	S. 62° E	.4	
57	55	......	Op. plank	Surface	10	S. 62° E	.2	
57	55	......	8′ Tnr.; 2 wng.	Bottom.	11	S. 62° E	.2	Trawl net badly torn; larger wing net torn.
57	55	......	Sig. sdr			None		
56	55	......	Sig. sdr		34	S. 64° E	.5	
56	55	......	Sig. sdr			None		
56	55	......	9′ Tnr.; 2 wng.	Bottom.	11	S. 64° E	.3	Net slightly torn from weight of mud.
56	55	......	Sig. sdr			None		
58	55	......	Sig. sdr		35	S. 41° W	.7	
58	55	......	8′ Tnr.; 2 wng.	Bottom.	14	S. 41° W	.5	
58	55	......	Sig. sdr			None		
55	55	45.0	Sig. sdr		1 20	S. 62° E	1.9	
55	55	......	10′ Blk.; 2 wng.	Bottom.	30	S. 62° E	1.2	1 wing net fouled of its own mouth.
56	55	......	Sig. sdr			None		
56	55	......	Op. plank. ‖	100 fms.	3	None		Hauled simultaneously on same line.
56	55	......	Op. plank. ‖	200 fms.	6	None		
56	55	......	Op. plank. ‖	300 fms.	9	None		
57	55	......	Sig. sdr			None		
58	55	......	Sig. sdr		58	S. 61° E	1.2	
58	55	......	10′ Blk.; 1 swab; 2 wng.	Bottom.	20	S. 61° E	1.7	
57	55	......	Sig. sdr			None		
56	55	......	Sig. sdr			None		
56	56	......	Op. plank. ‖	100 fms.	4	None		Hauled simultaneously on same line.
56	56	......	Op. plank. ‖	200 fms.	9	None		
56	56	......	Op. plank	300 fms.	13	None		

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Monterey Bay, California—Continued.		1904.		*fms.*	
D. 4514	Point Pinos Lt. Ho., S. 39° E., 10.7 miles.	C. S. 5498	May 23	1.20 p.m.	524	gn. M.
				1.44 p.m.	406	gn. M.
				1.44 p.m.	406–394	gn. M., R.
				1.53 p.m.	394	gn. M., R.
D. 4515	Point Pinos Lt. Ho., S. 18° E., 8.1 miles.	do	May 23	2.36 p.m.	368	gn. M., bk. Sp., Sh.
				2.53 p.m.	368–495–198	gn. M., crs. S., Sh.
				2.55 p.m.	495	hrd. gy. S.
				2.55 p.m.	495–198	hrd. gy. S.
				3.20 p.m.	198	hrd. gy. S.
D. 4516	Point Pinos Lt. Ho., S. 49° E., 12.5 miles.	do	May 24	9.23 a.m.	756	gn. M.
				10.06 a.m.	756–718	gn. M.
				10.28 a.m.	718	gn. M.
				10.38 a.m.	718	gn. M.
				10.38 a.m.	718	gn. M.
				10.38 a.m.	718	gn. M.
D. 4517	Point Pinos Lt. Ho., S. 52° E., 9.1 miles.	do	May 24	1.10 p.m.	766	gn. M., S.
				1.12 p.m.	766–750	gn. M., S.
				1.40 p.m.	750	gn. M., S.
				1.52 p.m.	750	gn. M., S.
				1.52 p.m.	750	gn. M., S.
				1.52 p.m.	750	gn. M., S.
D. 4518	Point Pinos Lt. Ho., S. 42° E., 5.7 miles.	do	May 24	3.00 p.m.	140	hrd. S.
				3.08 p.m.	76	hrd. S.
				3.09 p.m.	76–66	hrd. S.
				3.12 p.m.	76–66	hrd. S.
				3.15 p.m.	76–66	hrd. S.
				3.24 p.m.	66	hrd. S.
D. 4519	Point Pinos Lt. Ho., S. 30° W., 11.8 miles.	do	May 26	8.53 a.m.	35	hrd. gy. S.
				8.58 a.m.	35–27	hrd. gy. S.
				9.01 a.m.	27	hrd. gy. S.
D. 4520	Point Pinos Lt. Ho., S. 28° W., 11.2 miles.	do	May 26	9.13 a.m.	44	gn. M.
				9.14 a.m.	44–32–43	gn. M.
				9.18 a.m.	32	gn. M.
				9.23 a.m.	43	gn. M.
D. 4521	Point Pinos Lt. Ho., S. 25° W., 10.8 miles.	do	May 26	9.36 a.m.	119	dk. gn. M.
				9.37 a.m.	119–140	dk. gn. M.
				9.45 a.m.	140	dk. gn. M.
D. 4522	Point Pinos Lt. Ho., S. 21° W., 10.1 miles.	do	May 26	10.05 a.m.	149	gy. S., Sh
				10.11 a.m.	149–130	gy. S., Sh
				10.24 a.m.	130	gy. S., Sh
D. 4523	Point Pinos Lt. Ho., S. 17° W., 9.5 miles.	do	May 26	10.44 a.m.	108	sft. dk. M.
				10.49 a.m.	108–75	sft. dk. M.
				10.59 a.m.	75	sft. dk. M.
D. 4524	Point Pinos Lt. Ho., S. 10° W., 9.9 miles.	do	May 26	11.25 a.m.	228	sft. gy. M.
				11.35 a.m.	228–213	sft. gy. M.
				11.44 a.m.	213	sft. gy. M.
D. 4525	Point Pinos Lt. Ho., S. 10° W., 9.4 miles.	do	May 26	1.11 p.m.	222	sft. gy. M.
				1.26 p.m.	222–222	sft. gy. M.
D. 4526	Point Pinos Lt. Ho., S. 7° W., 9.3 miles.	do	May 26	2.13 p.m.	204	sft. gy. M.
				2.22 p.m.	204–239	sft. gy. M.
				2.40 p.m.	239	sft. gy. M.
D. 4527	Point Pinos Lt. Ho., S. 10° W., 8.5 miles.	do	May 26	3.15 p.m.	282	hrd. S.
				3.32 p.m.	337	hrd. S.
				3.32 p.m.	337–183	hrd. S.
				3.52 p.m.	183	hrd. S.
D. 4528	Point Pinos Lt. Ho., S. 58° E., 12.7 miles.	do	May 27	9.18 a.m.	545	sft. gy. M.
				9.54 a.m.	766–800	sft. gy. M.
				9.56 a.m.	766	sft. gy. M.
				10.16 a.m.	800	sft. gy. M.
D. 4529	Point Pinos Lt. Ho., S. 61° E., 10.9 miles.	do	May 27	11.15 a.m.	780	hrd. M., S.
				11.15 a.m.	780–799	hrd. M., S.
				11.37 a.m.	799	hrd. M., S.
D. 4530	Point Pinos Lt. Ho., S. 78° E., 6.8 miles.	do	May 27	1.49 p.m.	958	sft. gy. M.
				2.25 p.m.	847	sft. gy. M.
				2.28 p.m.	847–755	sft. gy. M.
				2.55 p.m.	755	sft. gy. M.
D. 4531	Point Pinos Lt. Ho., N. 64° E., 2.1 miles.	do	May 28	8.03 a.m.	26	fne. gy. S., P., R.
				8.04 a.m.	26–28	fne. gy. S., P., R.
				8.18 a.m.	28	fne. gy. S., P., R.

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Apparatus.	Trial. Depth.	Trial. Duration.	Drift. Direction.	Drift. Distance.	Remarks.
°F.	°F.	°F.			h. m.		mi.	
58	55	......	Sig. sdr		1 10	S. 62° E.	.4	
57	55	......	Sig. sdr			None		
57	55	......	10′ Blk.; 1 swab; 2 wng.	Bottom.	6	S. 62° E.	.1	1 wing net torn; trawl net torn badly.
57	55	......	Sig. sdr			None		
56	54	......	Sig. sdr		1 3	SE.	1.2	
57	55	......	9′ Tnr	Bottom.	28	SE.	.7	
57	55	......	Sig. sdr			None		
57	55	......	2 op. plank	Surface.	18	SE.	.4	2 nets towed side by side.
57	55	......	Sig. sdr			None		
55	54	......	Sig. sdr		1 43	S. 49° E.	1.4	
56	55	......	9′ Tnr	Bottom.	20	S. 49° E.	.6	Some bottom fish floated up out of net; dusky albatross devoured some; few recovered by lowering a boat.
56	55	......	Sig. sdr			None		
57	55	......	Op. plank ‖	100 fms.	8	None		Hauled simultaneously on same line.
57	55	......	Op. plank ‖	200 fms.	14	None		
57	55	......	Op. plank ‖	300 fms.	20	None		
56	56	......	Sig. sdr		1 30	S. 78° E.	.8	
56	56	......	10′ Blk; 2 wng.	Bottom.	18	S. 78° E.	.3	
56	56	......	Sig. sdr			None		
56	56	......	Op. plank ‖	100 fms.	5	None		Hauled simultaneously on same line.
56	56	......	Op. plank ‖	200 fms.	11	None		
56	56	......	Op. plank ‖	300 fms.	16	None		
58	56	......	Sig. sdr			S. 42° E.	1.0	
58	56	......	Sig. sdr			None		
58	56	......	10′ Blk; 2 wng	Bottom.	16	S. 42° E.	.8	
58	56	......	Surf. tow	Surface.	10	S. 42° E.	.5	
58	56	......	Op. plank	Surface.	10	S. 42° E.	.5	
58	56	......	Sig. sdr			None		
60	56	......	Sig. sdr		12	S. 62° W.	.2	
60	56	......	10′ Blk.	Bottom.	4	S. 62° W.	.1	
60	56	......	Sig. sdr			None		
60	56	......	Sig. sdr		15	S. 85° W.	.5	
60	56	......	10′ Blk.	Bottom.	9	S. 85° W.	.3	
61	56	......	Sig. sdr			None		
61	56	......	Sig. sdr			None		
62	56	......	Sig. sdr		26	S. 69° W.	.6	
62	56	......	10′ Blk.	Bottom.	14	S. 69° W.	.4	
63	56	......	Sig. sdr			None		
64	56	......	Sig. sdr		30	S. 75° W.	.6	
64	56	......	10′ Blk.	Bottom.	14	S. 75° W.	.4	
64	56	......	Sig. sdr			None		
63	57	......	Sig. sdr		30	S. 80° W.	.5	
63	57	......	10′ Blk	Bottom.	14	S. 80° W.	.4	Heavy load of mud.
63	57	......	Sig. sdr			None		
63	57	......	Sig. sdr		34	S. 14° W.	.4	
63	57	......	10′ Blk.	Bottom.	14	S. 14° W.	.3	
62	57	......	Sig. sdr			None		
60	57	......	Sig. sdr		45	S. 32° E.	.7	
60	57	......	10′ Blk.	Bottom.	18	S. 32° E.	.4	Whale fouled sounding wire and parted it at an intermediate station.
59	57	......	Sig. sdr		42	S. 28° E.	.4	
59	57	......	10′ Blk.	Bottom.	18	S. 28° E.	.3	Net slightly torn.
59	57	......	Sig. sdr			None		
58	56	......	Sig. sdr		44	S. 12° E.	.7	
58	56	......	Sig. sdr			None		
58	56	......	9′ Tnr	Bottom.	18	S. 12° E.	.4	
58	56	......	Sig. sdr			None		
56	56	......	Sig. sdr		1 26	S. 38° E.	.8	
58	56	......	10′ Blk.	Bottom.	19	S. 38° E.	.4	
59	56	......	Sig. sdr			None		
60	57	......	Sig. sdr			None		
57	58	......	Sid. sdr		1 17	S. 40° E.	.7	
57	58	......	9′ Tnr.	Bottom.	20	S. 40° E.	.4	
57	58	......	Sig. sdr			None		
61	58	......	Sig. sdr		2 2	S. 18° E.	1.0	
61	58	......	Sig. sdr			None		
61	58	......	8′ Alb. Blk.	Bottom.	33	S. 18° E.	.6	Net badly torn from weight of mud.
61	58	......	Sig. sdr			None		
58	58	......	Tnr. sdr		20	N. 48° W.	.3	
58	58	......	10′ Blk.	Bottom.	15	N. 48° W.	.2	Frame bent; net torn.
58	58	......	Tnr. sdr			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Monterey Bay, California—Continued.		1904.		*fms.*	
D. 4532	Point Pinos Lt. Ho., N. 76° E., 2.3 miles.	C. S. 5498	May 28	8.36 a. m.	30	gy. S., R
				8.39 a. m.	30	gy. S., R
D. 4533	Point Pinos Lt. Ho., S. 73° E., 4.9 miles.	....do....	May 28	9.18 a. m.	293	gn. M., S
				9.39 a. m.	293–144	gn. M., S
				9.58 a. m.	144	gn. M., S
D. 4534	Point Pinos Lt. Ho., S. 80° E., 4 miles.	....do....	May 28	10.14 a. m.	86	hrd. gy. S
				10.22 a. m.	86–76	hrd. gy. S
				10.36 a. m.	76	hrd. gy. S
D. 4535	Point Pinos Lt. Ho., N. 86° E., 3.7 miles.	....do....	May 28	10.47 a. m.	71	hrd. gy. S
				10.51 a. m.	71–54	hrd. gy. S
				11.12 a. m.	54	hrd. gy. S
D. 4536	Point Pinos Lt. Ho., S. 65° E., 9.6 miles.	....do....	May 31	8.56 a. m.	1,006	hrd. S., M
				9.47 a. m.	1,006–1,041	hrd. S., M
				10.20 a. m.	1,041	hrd. S., M
D. 4537	Point Pinos Lt. Ho., S. 74° E., 7.4 miles.	....do....	May 31	11.23 a. m.	1,062	hrd. S., M
				11.38 a. m.	1,062–861	hrd. S., M
				12.00 m.	861	hrd. S., M
D. 4538	Point Pinos Lt. Ho., S. 85° E., 6.5 miles.	....do....	May 31	1.29 p. m.	871	hrd. gy. S
				1.59 p. m.	871–795	hrd. gy. S
				2.32 p. m.	795	hrd. gy. S
D. 4539	Point Pinos Lt. Ho., N. 62° E., 4.8 miles.	....do....	May 31	3.32 p. m.	609	hrd. S., M
				3.45 p. m.	518	hrd. S., M
				3.45 p. m.	518–465	hrd. S., M
				4.05 p. m.	465	hrd. S., M
D. 4540	Point Pinos Lt. Ho., SE. 11.2 miles.	....do....	June 1	9.04 a. m.	551	gn. M
				9.28 a. m.	551–389	gn. M
				9.48 a. m.	389	gn. M
D. 4541	Point Pinos Lt. Ho., S. 41° E., 9.3 miles.	....do....	June 1	10.28 a. m.	381	gn. M., S
				10.44 a. m.	381–633	gn. M., S
				11.19 a. m.	633	gn. M., S
D. 4542	Point Pinos Lt. Ho., S. 35° E., 7.2 miles.	....do....	June 1	1.15 p. m.	677	hrd. S., M
				1.30 p. m.	456–331	hrd. S., M
				1.32 p. m.	456	hrd. S., M
				2.00 p. m.	331	hrd. S., M
D. 4543	Point Pinos Lt. Ho., S. 25° E., 5.4 miles.	....do....	June 1	2.26 p. m.	93	hrd. S., R
				2.27 p. m.	93–53	hrd. S., R
				3.29 p. m.	53	hrd. S., R
D. 4544	Point Pinos Lt. Ho., S. 50° E., 10.9 miles.	....do....	June 2	9.55 a. m.	724	gy. S., M
				10.21 a. m.	724–1,000	gy. S., M
				10 57 a. m.	1,000(?)	gy. S., M
D. 4545	Point Pinos Lt. Ho., S. 56° E., 7.7 miles.	....do....	June 2	1.08 p. m.	900	hrd. S., M
				1.53 p. m.	900–700	hrd. S., M
				2.25 p. m.	700	hrd. S., M
D. 4546	Point Pinos Lt. Ho., S. 46° E., 8.4 miles.	....do....	June 3	8.43 a. m.	849	fne. bk. S
				9.22 a. m.	849	fne. bk. S., R
D. 4547	Point Pinos Lt. Ho., S. 82° E., 10.5 miles.	....do....	June 6	9.30 a. m.	1,083	sft. gy. M
				10.30 a. m.	1,083	gy. M., R
D. 4548	Point Pinos Lt. Ho., S. 26° W., 3 miles.	....do....	June 7	8.37 a. m.	46	crs. S., Sh., R
				8.45 a. m.	46–54	crs. S., Sh., R
				8.58 a. m.	54	crs. S., Sh., R
D. 4549	Point Pinos Lt. Ho., S. 9° W., 2.6 miles.	....do....	June 7	9.01 a. m.	56	crs. S., Sh., R
				9.07 a. m.	56–57	crs. S., Sh., R
				9.15 a. m.	57	crs. S., Sh., R
D. 4550	Point Pinos Lt. Ho., S. 6° E., 4.6 miles.	....do....	June 7	9.35 a. m.	50	gn. M., R
				9.42 a. m.	50–57	gn. M., R
				10.00 a. m.	57	gn. M., R
D. 4551	Point Pinos Lt. Ho., S. 9° E., 4.5 miles.	....do....	June 7	10.18 a. m.	56	crs. S., Sh., R
				10.29 a. m.	56–46	crs. S., Sh., R
				10.43 a. m.	46	crs. S., Sh., R
D. 4552	Point Pinos Lt. Ho., S. 73° E., 4 miles.	....do....	June 9	8.40 a. m.	73	gn. M., R
				8.41 a. m.	73–66	gn. M., R
				8.53 a. m.	66	gn. M., R
D. 4553	Point Pinos Lt. Ho., S. 67° E., 3.7 miles.	....do....	June 9	9.19 a. m.	74	R
				9.25 a. m.	74–65	R
				9.47 a. m.	65	R
D. 4554	Point Pinos Lt. Ho., S. 76° E., 3 miles.	....do....	June 9	10.04 a. m.	60	gn. M., R
				10.07 a. m.	60–80	gn. M., R
				10.38 a. m.	80	gn. M., R

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
58	58	......	Tnr. sdr		11	N. 22° W	.2	
58	58	......	9′ Tnr.; 2 swabs.	Bottom.	14	N. 22° W	.1	Net badly torn.
58	58	......	Tnr. sdr		47	N. 80° E	.6	
58	58	......	8′ Tnr; 2 swabs.	Bottom.	19	N. 80° E	.4	
58	58	......	Tnr. sdr			None		
56	57	......	Sig. sdr		27	S. 6° E	.5	
56	57	......	8′ Alb. Blk.; 1 swab.	Bottom.	15	S. 6° E	.4	
56	57	......	Sig. sdr			None		
55	57	......	Sig. sdr		29	S. 69° E	.8	
55	57	......	8′ Alb. Blk.; 1 swab.	Bottom.	20	S. 69° E	.7	
55	57	......	Sig. sdr			None		
67	58	......	Sig. sdr			S. 41° E	1.8	
64	58	......	8′ Alb. Blk	Bottom.	18	S. 41° E	.6	
62	58	38.5	Sig. sdr			None		
60	59	......	Sig. sdr		1 52	S. 5° E	.8	
59	59	......	10′ Blk	Bottom.	18	S. 5° E	.3	
58	59	......	Sig. sdr			None		
60	59	......	Sig. sdr		1 39	S. 37° E	2.2	
59	59	......	8′ Alb. Blk	Bottom.	25	S. 37° E	.9	
58	59	......	Sig. sdr			None		
58	58	......	Sig. sdr		55	S. 47° E	.9	
58	58	......	Sig. sdr			None		
58	58	......	10′ Blk	Bottom.	15	S. 47° E	.4	
58	58	......	Sig. sdr			None		
63	59	......	Sig. sdr		1 16	S. 60° E	1.6	
62	59	......	10′ Blk	Bottom.	15	S. 60° E	.6	
61	59	......	Sig. sdr			None		
60	59	......	Sig. sdr		1 18	S. 61° E	2.1	
60	59	......	10′ Blk	Bottom.	35	S. 61° E	1.5	
59	59	......	Sig. sdr			None		
64	59	......	Sig. sdr		1 2	S. 61° E	1.7	
63	59	......	9′ Tnr	Bottom.	28	S. 61° E	.8	
63	59	......	Sig. sdr			None		
61	59	......	Sig. sdr			None		
61	59	......	Sig. sdr		1 13	S. 60° E	2.0	
61	59	......	9′ Tnr	Bottom.	1 2	S. 60° E	1.8	Net wrecked.
61	59	......	Sig. sdr			None		
58	58	......	Sig. sdr		1 48	S. 35° E	3.1	
58	58	......	9′ Tnr	Bottom.	30	S. 35° E	1.5	
57	58	......	Sig. sdr			None		Depth estimated; wire tending at a large angle from perpendicular.
58	58	......	Sig. sdr		2 19	S. 35° E	2.3	Depth estimated; sounding wire not perpendicular.
57	58	......	8′ Alb. Blk	Bottom.	29	S. 35° E	1.0	
57	58	......	Sig. sdr			None		Depth estimated; sounding wire not perpendicular.
60	56	......	Sig. sdr		1 57	S. 52° E	2.1	
60	56	......	8′ Alb. Blk		24	S. 52° E	.9	Net badly torn.
61	56	......	Sig. sdr		2 5	S. 60° W	3.1	
62	55	......	10′ Blk	Bottom.	16	S. 60° W	.6	Net wrecked.
66	57	......	Tnr. sdr		23	S. 83° W	1.0	
66	57	......	8 swabs	Bottom.	11	S. 83° W	.6	
66	57	......	Tnr. sdr			None		
66	57	......	Tnr. sdr		17	S. 83° W	.6	
66	57	......	8 swabs; m. b.	Bottom.	8	S. 83° W	.4	
66	57	......	Tnr. sdr			None		
62	57	......	Tnr. sdr		27	South	1.0	
60	57	......	6 swabs; b. d.	Bottom.	16	South	.8	
57	58	......	Tnr. sdr			None		
57	58	......	Tnr. sdr		28	S. 37° E	.6	
57	58	......	6 swabs; b. d.	Bottom.	13	S. 37° E	.4	Lost one swab; tangle frame bent; boat dredge net and bag torn badly.
57	58	......	Tnr. sdr			None		
61	58	......	Tnr. sdr		24	S. 20° E	.7	
61	58	......	8 swabs; m. b.	Bottom.	14	S. 20° E	.4	
61	58	......	Tnr. sdr					
59	58	......	Tnr. sdr		31	S. 2° E	1.0	
59	58	......	8 swabs; m. b.	Bottom.	21	S. 2° E	.8	
59	58	......	Tnr. sdr			None		
57	57	......	Sig. sdr		38	N. 84° W	1.2	
57	57	......	6 swabs; m. b.	Bottom.	32	N. 84° W	1.0	
57	57	......	Sig. sdr			None		

DREDGING RECORDS OF THE CALIFORNIA COAST

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Monterey Bay, California—Continued.		1904.		*fms.*	
D. 4555	Point Pinos Lt. Ho., S. 63° E., 3.4 miles.	C. S. 5498	June 9	11.25 a. m.	66	gn. M., R
				11.29 a. m.	66–69	gn. M., R
				11.43 a. m.	69	gn. M., R
D. 4556	Point Pinos Lt. Ho., S. 7° E., 3.7 miles.	do	June 9	1.17 p. m.	56	R
				1.19 p. m.	56–59	R
				1.36 p. m.	59	R
D. 4557	Point Pinos Lt. Ho., S. 25° W., 3.1 miles.	do	June 9	2.03 p. m.	53	R
				2.05 p. m.	53–54	R
				2.19 p. m.	54	R
D. 4558	Point Pinos Lt. Ho., S. 79° W., 2 miles.	do	June 9	2.40 p. m.	40	R
				2.41 p. m.	40–28	R
				2.59 p. m.	28	R
D. 4559	Point Pinos Lt. Ho., N. 76° W., 2.3 miles.	do	June 9	3.06 p. m.	22	fne. gy. S
				3.08 p. m.	22–8	fne. gy. S
				3.32 p. m.	8	fne. gy. S
D. 4560	Santa Cruz Lt. Ho., N. 71° W., 2.4 miles.	do	June 11	7.52 a. m.	10	fne. gy. S., R
				7.54 a. m.	10–12	fne. gy. S., R
				8.00 a. m.	12	fne. gy. S., R
D. 4561	Santa Cruz Lt. Ho., N. 73° W., 3.3 miles.	do	June 11	8.38 a. m.	15	crs. S., Sh., R
				8.40 a. m.	15–14	crs. S., Sh., R
				8.52 a. m.	14	crs. S., Sh., R
D. 4562	Santa Cruz Lt. Ho., N. 72° W., 8.1 miles.	do	June 11	10.13 a. m.	10	hrd. S., R
				10.14 a. m.	10–11	hrd. S., R
				10.43 a. m.	11	hrd. S., R
D. 4563	Santa Cruz Lt. Ho., N. 87° W., 1.9 miles.	do	June 11	11.34 a. m.	8	rky
				11.35 a. m.	8–8	rky
				11.44 a. m.	8	rky
D. 4564	Santa Cruz Lt. Ho., N. 85° W., 1.6 miles.	do	June 11	11.48 a. m.	9	rky
				11.49 a. m.	9–10	rky
				11.57 a. m.	10	rky
	San Francisco entrance, California.					
D. 4565	SE. Farallone Id. Lt. Ho., N. 56° E., 9 miles.	C. S. 5500	Sept. 16	10.19 a. m.	587	bl. M
				11.14 a. m.	587–495	bl. and gn. M., R
				11.54 a. m.	495	gn. M
H. 4804	SE. Farallone Id. Lt. Ho., N. 51° E., 9.3 miles.	do	Sept. 16	11.54 a. m.	495	gn. M
D. 4566	Point Bonita Lt. Ho., N. 66° E., 10.5 miles.	do	Sept. 16	3.33 p. m.	22	gy. S
				3.36 p. m.	22	gy. S

INVESTIGATIONS OF THE ALBATROSS, 1904—Continued.

Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Apparatus.	Trial. Depth.	Trial. Duration.	Drift. Direction.	Drift. Distance.	Remarks.
°F.	°F.	°F.			h. m.		mi.	
59	57	......	Sig. sdr	....	21	S. 87° W	.5	
59	57	......	8 swabs; m. b	Bottom.	14	S. 87° W	.4	
59	57	......	Sig. sdr			None		
56	55	......	Sig. sdr		23	S. 11° E	.7	
56	55	......	6 swabs; m. b	Bottom.	17	S. 11° E	.6	Lost 1 swab.
56	55	......	Sig. sdr	....	....	None	......	
55	55	......	Sig. sdr	....	23	S. 15° E	.8	
55	55	......	8 swabs; m. b	Bottom.	15	S. 15° E	.6	
55	55	......	Sig. sdr			None		
55	55	......	Tnr. sdr		23	S. 5° E	.8	
55	55	......	6 swabs; m. b	Bottom.	18	S. 5° E	.7	
55	55	......	Tnr. sdr			None		
55	55	......	Tnr. sdr	....	27	S. 6° E	.7	
55	55	......	10′ Blk	Bottom.	23	S. 6° E	.6	
55	55	......	Hand lead		....	None	......	
63	60	......	Tnr. sdr	....	9	S. 52° E	.3	
63	60	......	6 swabs; m. b	Bottom.	6	S. 52° E	.2	
63	60	......	Tnr. sdr			None		
66	60	......	Tnr. sdr	....	17	N. 86° W	.6	
66	60	......	8 swabs; m. b	Bottom.	13	N. 86° W	.4	
66	60	......	Tnr. sdr			None		
64	58	......	Tnr. sdr		31	N. 40° W	1.0	
64	58	......	6 swabs; m. b	Bottom.	29	N. 40° W	.9	
64	58	......	Tnr. sdr			None		
67	59	......	Tnr. sdr		12	S. 81° W	.3	
67	59	......	8 swabs; m. b	Bottom.	10	S. 81° W	.3	Mud bag badly torn.
67	59	......	Tnr. sdr			None		
67	59	......	Tnr. sdr		11	S. 50° W	.5	
67	59	......	8 swabs; m. b	Bottom.	8	S. 50° W	.4	Bottom very rough.
67	59	......	Tnr. sdr	....	....	None	......	
60	60	......	Luc. sdr		1 54	S. 29° E	1.2	
60	60	......	8′ Alb. Blk	Bottom.	17	S. 29° E	.4	Net torn.
60	60	......	Luc. sdr	....	....	None	......	Position same as H. 4804.
60	60	......	Luc. sdr			None		
63	60	......	Luc. sdr	....	15	E	.5	
63	60	......	8′ Alb. Blk	Bottom.	10	E	.4	

2. CRUISE IN THE EASTERN PACIFIC.

From October 6, 1904, to February 24, 1905, the *Albatross*, in charge of Mr. Alexander Agassiz, was detailed for investigations in the eastern Pacific in the region lying between Panama, Callao (Peru), Easter Island, and the Gambier Islands. This was the vessel's second cruise in these waters, similar explorations, also conducted by Mr. Agassiz, having been made in 1891. Much interest attaches to this work, because there is no other oceanic region situated at so great a distance from a continental area and interrupted by so few islands. The eastern tropical Pacific extends south from a line between Acapulco and the Galapagos and to Cape San Francisco as a northern boundary, to a distance of over 3,000 miles, as far as the latitude of Manga Reva, Easter Island, and a point north of Valparaiso. The distance from Manga Reva to the South American coast is fully 3,500 miles, with nothing to break this vast expanse of water. (General Report of the Expedition, by Alexander Agassiz, Memoirs of the Museum of Comparative Zoology, vol. xxxviii, 1906.)

The collections are rich in material for studies of oceanic fauna and bottom deposits, and they include also some plants from Manga Reva and Easter Island which possess much interest in a consideration of the origin and distribution of the flora of the eastern Pacific.

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Coast of California.		1904.		*fms.*	
D. 4567	Pigeon Point Lt. Ho., S. 34° E., 10.5 miles. (37° 19′ N., 122° 30′ W.)	H. O. 1006; published June, 1887; ext. cor. Nov., 1899.	Oct. 6	1.30 p.m.	5–65*	....
D. 4568	Point Pinos Lt. Ho., E., 12 miles. (36° 38′ N., 122° 11′ W.)	....do....	Oct. 6	5.30 p.m.	30–600*	....
D. 4569	Point Arguello Lt. Ho., S. 63° E., 14.5 miles. (34° 41′ N., 120° 55′ W.)	....do....	Oct. 7	6.00 a.m.	40–600*	....
D. 4570	Point Conception Lt. Ho., N. 4° W., 7 miles. (34° 20′ N., 120° 27′ 30″ W.)	....do....	Oct. 7	9.00 a.m.	50–200*	....
D. 4571	E. point Santa Rosa Id., N. 50° W., 25 miles. (33° 40′ N., 119° 35′ W.)	....do....	Oct. 7	3.30 p.m.	900*	....
				3.47 p.m.	900*	....
				3.47 p.m.	900*	....
D. 4572	E. point, San Nicolas Id., S. 3° W., 16 miles. (33° 30′ N., 119° 25′ W.)	....do....	Oct. 7	5.30 p.m.	20–900*	....
D. 4573	Point Banda (lower California) N. 81° E., 74 miles. (31° 35′ N., 118° 10′ W.)	....do....	Oct. 8	7.00 a.m.	400–900*	....

Incidentally collections were made at a number of stations en route to Panama from San Francisco.

During the cruise there were made 203 hauls with plankton nets. Of these, 134 were surface hauls, 65 with large nets and 69 with small Kofoid nets; 54 were intermediate hauls (these exclusive of 4 trials with the Tanner intermediate net and 1 with the Cuhn-Petersen), in all of which Kofoid nets were used in conjunction with larger nets; 15 were vertical hauls. Forty-three hauls were made with beam trawls. Of these, 30 employed the Albatross-Blake trawl, 2 the 9-foot, 14 the 8-foot, 7 the 6-foot, and 7 the 5½-foot. In 5 the 8-foot Tanner frame was used and in the remaining 8 the 8-foot Agassiz pattern. In 10 of the 43 hauls the net was either wrecked or upset. The tangles were used once in a deep haul, but made no catch. The soundings numbered 111.

The *Albatross'* regular series of dredging and hydrographic station numbers were maintained in this cruise. Through an error in a previous cruise the hydrographic series as originally published in the Memoirs of the Museum of Comparative Zoology does not correspond with the vessel's corrected record; an additive factor of 301 is required for all of the hydrographic numbers there published—thus station H. 4504 should be H. 4805, etc. This correction, which applies only to the hydrographic stations, however, is necessary to prevent a duplication of the vessel's numbers.

CRUISE OF THE ALBATROSS, 1904–5.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
59–63	63–60	......	Pump-filter φ.	2 fms....	3 30	S	35.0	
67–63	67–64	......	Pump-filter φ.	2 fms....	4 0	S. 22° E...	45.0	Distance from shore, 3 to 15 miles. Course crosses mouth of Monterey Bay.
62–60	63–60	......	Pump-filter φ.	2 fms....	12 30	S. 28° E...	140.0	Distance from shore, 5 to 18 miles.
61–64	63–64	......	Pump-filter φ.	2 fms....	3 0	S. 47° E...	35.0	Distance from shore, 4 to 14 miles.
69	66	......	K. 2; surf. 2 †‖	300 fms. to surface.	22	None........	....	
69	66	......	Surf. 1.........	Surface.	18	S. 50° E...	.6	
69	66	......	K. 1; K. 2‡...	Surface.	18	S. 50° E...	.6	
64–70	64–66	......	Pump-filter φ.	2 fms....	8 30	SE..........	75.0	Distance from shore, 1½ to 21 miles; course across Santa Barbara Channel and through Santa Cruz Channel.
67–65	64–67	......	Pump-filter φ.	2 fms....	13 30	S. 30° E...	135.0	Distance from shore, 14 to 65 miles; course through channel between San Nicolas and Santa Barbara Islands and between Cortez and Tanner Banks and San Clemente Island.

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	West Coast of Lower California.		1904.		*fms.*	
D. 4574	Cape Colnett, N. 65° E., 58 miles. (30° 35′ N., 117° 23′ W.)	H. O. 1006; published June, 1887; ext. cor. Nov., 1899.	Oct. 8	3.16 p. m.	1,400*	
				3.35 p. m.	1,400*	
				3.35 p. m.	1,400*	
D. 4575	Cape San Quentin, N. 84° E., 60 miles. (30° 15′ N., 117° 10′ W.)	....do....	Oct. 8	5.30 p. m.	700-1,400*	
D. 4576	Cape San Quentin, N. 75° E., 55 miles. (29° 52′ N., 116° 56′ W.)	....do....	Oct. 8	8.35 p. m.	1,500*	
				8.35 p. m.	1,500*	
D. 4577	N. point, Cerros Id., S. 87° E., 37 miles. (28° 25′ N., 115° 55′ W.)	....do....	Oct. 9	7.00 a. m.	1,000-2,000*	
D. 4578	Abreojos Point, S. 71° E., 61 miles. (27° 2′ N., 114° 40′ W.)	....do....	Oct. 9	7.00 p. m.	50-1,000*	
D. 4579	Cape San Lazaro, S. 57° E., 60 miles. (25° 20′ N., 113° 13′ W.)	....do....	Oct. 10	7.00 a. m.	500-1,500*	
D. 4580	Cape San Lazaro, S. 70° E., 23 miles. (24° 55′ N., 112° 45′ W.)	....do....	Oct. 10	11.05 a. m.	320*	
				11.22 a. m.	320*	
				11.22 a. m.	320*	
D. 4581	Cape Tosco, N. 55° E., 7.5 miles. (24° 15′ N., 111° 52′ W.)	....do....	Oct. 10	7.00 p. m.	50-500*	
D. 4582	Cape Falso, S. 57° E., 35 miles. (23° 12′ N., 110° 32′ W.)	....do....	Oct. 11	7.00 a. m.	50-300*	
D. 4583	Cape Falso, N. 35° E., 9 miles. (22° 45′ N., 110° 5′ W.)	....do....	Oct. 11	10.20 a. m.	1,000*	
				11.02 a. m.	1,000*	
				11.02 a. m.	1,000*	
D. 4584	Cape San Lucas, N. 40° W., 62 miles. (22° 05′ N., 109° 10′ W.)	....do....	Oct. 11	7.00 p. m.	300-1,700*	
	Southwest Coast of Mexico.					
D. 4585	Cape Corrientes Lt. Ho., S. 71° E., 112 miles. (21° 00′ N., 107° 37′ W.)	H. O. 1006; published June, 1887; ext. cor. Nov., 1899.	Oct. 12	7.00 a. m.	1,500-1,800*	
D. 4586	Cape Corrientes Lt. Ho., S. 78° E., 82 miles. (20° 40′ N., 107° 10′ W.)	....do....	Oct. 12	10.15 a. m.	2,000*	
D. 4587	Cape Corrientes Lt. Ho., N. 50° E., 37 miles. (20° 00′ N., 106° 12′ W.)	....do....	Oct. 12	7.00 p. m.	1,000-2,000*	
D. 4588	Cape Corrientes Lt. Ho., N. 31° E., 37 miles. (19° 52′ N., 106° 02′ W.)	....do....	Oct. 12	8.31 p. m.	1,500*	
				8.33 p. m.	1,500*	
D. 4589	Farralon Point, N. 21° W., 35 miles. (18° 50′ N., 104° 50′ W.)	H. O. 1007; published Mar., 1887.	Oct. 13	10.18 a. m.	1,000*	
D. 4590	....do....	....do....	Oct. 13	10.30 a. m.	700-1,500*	
D. 4591	Point Telmo, S. 86° E., 9 miles. (18° 26′ N., 103° 40′ W.)	....do....	Oct. 13	7.00 p. m.	500-1,000*	
D. 4592	Point Telmo, N. 61° E., 4 miles. (18° 17′ 30″ N., 103° 35′ W.)	....do....	Oct. 13	7.36 p. m.	250*	
				7.37 p. m.	250*	

Cruise of the Albatross, 1904–5—Continued.

Temperature.			Apparatus.	Trial.			Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.		Direction.	Distance.	
°F.	°F.	°F.			h.	m.		mi.	
76	69	......	K. 1; K. 2 † ‖	300 fms. to surface.		7	None		
76	69	......	Surf. 2	Surface		17	S. 30° E.	.6	
76	69	......	K. 1; K. 2 ‡	Surface		17	S. 30° E.	.6	
67–76	70–68	......	Pump-filter ϕ	2 fms.	10	30	S. 33° E.	95.0	Distance from shore, 58 to 70 miles.
67	69	......	Surf. 2	Surface		16	S. 30° E.	.5	
67	69	......	K. 1; K. 2 ‡	Surface		16	S. 30° E.	.5	
70–65	70–66	......	Pump-filter ϕ	2 fms.	13	30	S. 30° E.	130.0	Distance from shore, 20 to 60 miles; course crosses mouth of Sebastian Vizcaino Bay.
69–74	70–71	......	Pump-filter ϕ	2 fms.	12	0	S. 40° E.	120.0	Distance from shore, 7 to 20 miles.
69–71	70–73	......	Pump-filter ϕ	2 fms.	12	0	S. 37° E.	125.0	Distance from shore, 15 to 65 miles.
74	76	......	K. 1; K. 2 † ‖	300 fms. to surface.		15	None		
74	76	......	Cuhn	Surface		13	S. 50° E.	.4	Towed from boom. Tow line parted; damage slight.
74	76	......	K. 1; K. 2 ‡	Surface		17	S. 50° E.	.5	
72–82	72–77	......	Pump-filter ϕ	2 fms.	12	0	S. 50° E.	100.0	Distance from shore, 5 to 60 miles; course across mouth of Magdalena Bay.
75–79	76–82	......	Pump-filter ϕ	2 fms.	12	0	S. 50° E.	95.0	Distance from shore, 7 to 22 miles.
82	83	......	K. 1; K. 2 † ‖	300 fms. to surface.		10	None		
83	83	......	Surf. 2	Surface		18	S. 50° E.	.6	
83	83	......	K. 1; K. 2 ‡	Surface		18	S. 50° E.	.6	
80–90	81–87	......	Pump-filter ϕ	2 fms.	12	0	S. 48° E.	95.0	Distance from shore, 9 to 60 miles; course crossing mouth of Gulf of California.
82–80	80–83	......	Pump-filter ϕ	2 fms.	12	0	S. 53° E.	105.0	Distance from shore, 60 to 100 miles; course crossing mouth of Gulf of California.
82	82	......	K. 1; K. 2 † ‖	300 fms. to surface.		16	None		Position in mouth of Gulf of California.
81–90	81–83	......	Pump-filter ϕ	2 fms.	12	0	S. 53° E.	100.0	Distance from shore, 28 to 65 miles; course crossing mouth of Gulf of California.
82	81	......	Surf. 3; e. 1	Surface		18	S. 50° E.	.6	
82	81	......	K. 1; K. 2 ‡	Surface		17	S. 50° E.	.6	
83	83	......	K. 1; K. 2 † ‖	300 fms. to surface.		22	None		With about 200 fms. out, stopped 5 minutes while heaving in.
81–83	81–83	......	Pump-filter ϕ	2 fms.	15	30	S. 49° E.	105.0	Distance from shore, 15 to 35 miles.
86–98	83–87	......	Pump-filter ϕ	2 fms.	8	30	S. 65° E.	75.0	Distance from shore, 5 to 20 miles.
84	83	......	Surf. 3; e. 1	Surface		18	S. 65° E.	.6	
84	83	......	K. 1; K. 2 ‡	Surface		18	S. 65° E.	.6	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Southwest coast of Mexico—Continued.		1904.		*fms.*	
D. 4593	Morro de Papanoa, S. 75° E., 43 miles. (17° 25′ N., 101° 50′ W.)	H. O. 1007; published Mar., 1887.	Oct. 14	7.00 a. m.	100-800*	
D. 4594	Morro de Papanoa, S. 86° E., 27 miles. (17° 17′ N., 101° 35′ W.)	....do....	Oct. 14	10.15 a. m.	500*	
D. 4595	Acapulco Lt. Ho., N. 88° E., 32 miles. (16° 48′ N., 100° 28′ W.)	....do....	Oct. 14	7.00 p. m.	500-1,000*	
D. 4596	Acapulco Lt. Ho., N. 88° E. (nearly), 32 miles. (16° 48′ N., 100° 27′ W.)	....do....	Oct. 14	7.06 p. m. 7.08 p. m.	700* 700*	
D. 4597	Point Escondido, N. 3° E., 13 miles. (16° 07′ 30″ N., 98° 37′ W.)	....do....	Oct. 15	7.00 a. m.	100-900*	
D. 4598	Galera Point, S. 86° E. 28 miles. (15° 58′ N., 98° 13′ W.)	....do....	Oct. 15	10.17 a. m.	500*	
D. 4599	Point of Rocks, N. 46° E., 10 miles. (15° 36′ N., 97° W.)	....do....	Oct. 15	7.00 p. m.	100-1,000*	
D. 4600	Point of Rocks, NE., 10 miles. (15° 36′ N., 96° 59′ W.)	....do....	Oct. 15	7.05 p. m. 7.06 p. m.	500* 500*	
D. 4601	Salinas Cruz Lt. Ho., N. 2° E., 72 miles. (14° 58′ N., 95° 15′ W.)	....do....	Oct. 16	7.00 a. m.	500-2,000*	
D. 4602	13° 38′ N., 93° 50′ W	....do....	Oct. 16	7.00 p. m.	2,000-2,400*	
	Southwest coast of Central America.					
D. 4603	San Jose de Guatemala Lt. Ho., N. 50° E., 135 miles. (12° 30′ N., 92° 32′ W.)	H. O. 1007; published Mar., 1887.	Oct. 17	7.30 a. m.	2,200-2,400*	
D. 4604	San Jose de Guatemala Lt. Ho., N. 43° E., 130 miles. (12° 22′ N., 92° 26′ W.)	....do....	Oct. 17	10.00 a. m.	2,200*	
D. 4605	San Jose de Guatemala Lt. Ho., N. 41° E., 127 miles. (12° 20′ N., 92° 13′ W.)	....do....	Oct. 17	12.58 p. m.	2,200*	
D. 4606	San Jose de Guatemala Lt. Ho., N. 20° E., 123 miles. (12° 00′ N., 91° 30′ W.)	....do....	Oct. 17	7.00 p. m.	1,500-2,500*	
D. 4607	....do..................	....do....	Oct. 17	7.03 p. m. 7.03 p. m.	2,000* 2,000*	
D. 4608	11° 10′ N., 89° 50′ W	....do....	Oct. 18	8.00 a. m.	1,600-2,000*	
D. 4609	11° 03′ N., 89° 35′ W	....do....	Oct. 18	10.17 a. m.	2,000*	
D. 4610	10° 32′ N., 88° 26′ W	....do....	Oct. 18	7.00 p. m.	1,800-2,000*	
D. 4611	10° 32′ N., 88° 25′ W	....do....	Oct. 18	7.03 p. m. 7.03 p. m.	1,800* 1,800*	
D. 4612	Point Guionos, E., 60 miles. (9° 53′ N., 86° 42′ W.)	....do....	Oct. 19	7.00 a. m.	1,600-1,800*	
D. 4613	Point Guionos, N. 73° E., 35 miles. (9° 43′ N., 86° 15′ W.)	....do....	Oct. 19	10.16 a. m.	1,500*	
D. 4614	Cape Blanco, N. 3° E., 27 miles. (9° 06′ N., 85° 08′ W.)	....do....	Oct. 19	7.00 p. m.	1,200-1,800*	
D. 4615	....do..................	....do....	Oct. 19	7.02 p. m. 7.02 p. m.	1,500* 1,500*	

CRUISE OF THE ALBATROSS, 1904-5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
84-80	84-81	......	Pump-filter φ.	2 fms....	12 0	S. 63° E...	120.0	Distance from shore, 3 to 25 miles.
83	84	......	K. 1; K. 2 † ‖.	300 fms. to surface.	15	None......	......	Caught a turtle at this station.
83-99	83-85	......	Pump-filter φ.	2 fms....	12 0	S. 63° E...	90.0	Distance from shore, 10 to 20 miles.
86	84	......	Surf. 3; c. 1....	Surface.	18	S. 60° E...	.6	
86	84	......	K. 1; K. 2 ‡...	Surface.	16	S. 60° E...	.5	
84-81	84-81	......	Pump-filter φ.	2 fms...	12 0	S. 70° E...	115.0	Distance from shore, 10 to 20 miles; changed silk in filter from no. 20 to no. 12 at beginning of this station.
83	84	......	K. 1; K. 2 † ‖..	300 fms to surface.	18	None.....	......	
82-93	85-82	......	Pump-filter φ.	2 fms...	12 0	S. 70° E...	100.0	Distance from shore, 5 to 15 miles.
85	82	......	K. 1; K. 2 ‡...	Surface.	20	S. 75° E...	.7	
85	82	......	Surf. 3; c. 1....	Surface.	18	S. 75° E...	.6	
84-81	83-81	......	Pump-filter φ.	2 fms...	12 0	S. 70° E...	110.0	Distance from shore, 8 to 60 miles; course across mouth of Gulf of Tehuantepec.
80-87	79-82	.....	Pump-filter φ.	2 fms...	12 0	SE........	115.0	Distance from shore, 60 to 115 miles; crossing mouth of Gulf of Tehuantepec.
82-83	81-83	......	Pump-filter φ.	2 fms...	12 30	SE........	105.0	Distance from shore, 100 to 110 miles; crossing mouth of Gulf of Tehuantepec.
84	84	......	K. 1; K. 2 ‡...	Surface.	30	S. 65° E...	.8	
84	85	......	K. 1; K. 2 † ‖..	300 fms. to surface.	24	None.....	......	
83-91	83-85	......	Pump-filter φ.	2 fms...	11 30	S. 65° E...	70.0	Distance from shore, 105 to 115 miles.
83	83	......	Surf. 3; c. 1....	Surface.	18	S. 65° E...	.6	
83	83	......	K. 1; K. 2 ‡...	Surface.	18	S. 65° E...	.6	
83-81	82-83	......	Pump-filter φ.	2 fms...	13 0	S. 63° E...	110.0	Distance from shore, 115 to 135 miles.
82	81	......	K. 1; K. 2 † ‖..	300 fms. to surface.	16	None.....	......	
86-78	82-78	......	Pump-filter φ.	2 fms...	11 0	S. 63° E...	95.0	Distance from shore, 135 to 145 miles; off Gulf of Fonseca.
78	78	......	Surf. 3; c. 1...	Surface.	18	S. 70° E...	.6	Position off Gulf of Fonseca.
78	78	......	K. 1; K. 2 ‡...	Surface.	20	S. 70° E...	.7	
79-78	78-80	......	Pump-filter φ.	2 fms..	12 0	S. 70° E...	110.0	Distance from shore, 55 to 135 miles; off Gulf of Fonseca.
81	80	......	K. 1; K. 2 † ‖..	300 fms. to surface.	16	None.....	......	
79-88	82-79	......	Pump-filter φ.	2 fms...	12 0	S. 63° E...	105.0	Distance from shore, 25 to 55 miles.
81	80	......	Surf. 3; c. 1....	Surface.	18	S. 60° E...	.6	Position off Gulf of Nicoya.
81	80	......	K. 1; K. 2 ‡...	Surface.	18	S. 60° E...	.6	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	Southwest coast of Central America—Continued.		1904.		*fms.*	
D. 4616	Burica Point, S. 80° E., 44 miles. (8° 10′ N., 83° 36′ W.)	H. O. 1007; published Mar., 1887.	Oct. 20	7.00 a. m.	900–1,500*	....
	South coast of Panama.					
D. 4617	Montuosa Islet, N. 43° E., 10 miles. (7° 21′ N., 82° 21′ W.)	H. O. 1007; published Mar., 1887.	Oct. 20	4.05 p. m.	1,000*	....
				4.27 p. m.	1,000*	....
				4.27 p. m.	1,000*	....
D. 4618	Montuosa Islet, N. 12° W., 12 miles. (7° 17′ N., 82° 11′ W.)	......do...	Oct. 20	7.00 p. m.	200–1,200*	....
D. 4619	.....do.....................	......do....	Oct. 20	7.00 p. m.	1,000*	....
				7.00 p. m.	1,000*	....
D. 4620	Mariato Point, N. 63° E., 60 miles. (6° 45′ N., 81° 47′ W.)	....do....	Oct. 21	8.00 a. m.	100–1,000*	....
D. 4621	Mariato Point, N. 55° E., 63 miles. (6° 36′ N., 81° 45′ W.)	......do....	Oct. 21	9.20 a. m.	581	gn. S...............
				10.14 a. m.	581	gn. M. R ....
D. 4622	Mariato Point, N. 52° E., 66 miles. (6° 31′ N., 81° 44′ W.)	......do....	Oct. 21	11.14 a. m.	581	gn. S...............
				12.00 m.	581	gn. S. R............
D. 4623	Mariato Point, N. 22° W., 14 miles. (6° 58′ N., 80° 48′ W.)	......do....	Oct. 21	7.00 p. m.	500–1,000*	....
D. 4624	.....do.....................	......do....	Oct. 21	7.03 p. m.	800*	....
				7.03 p. m.	800*	....
D. 4625	Cape Mala, S. 40° W., 42 miles. (8° 00′ N., 79° 33′ W.)	....do....	Oct. 22	7.00 a. m.	75–1,000*	....
D. 4626[a]	Anchorage off Panama, summit of Perico Island, S. 20° W., 0.4 mile. (8° 55′ N., 79° 31′ 30″ W.)	H. O. 1019; published Aug., 1887; ext. cor. May, 1901.	Oct. 22	7.00 p. m.	5–75*	....
	From Panama to Galapagos Islands.					
D. 4627	Cape Mala, N. 30° W., 7.5 miles. (7° 21′ N., 79° 56′ W.)	H. O. 1007; published Mar., 1887.	Nov. 2	7.07 p. m	60*	....
				7.07 p. m.	60*	....
D. 4628	Cape Mala, N. 13′ W., 11 miles. (7° 17′ N. 79° 57′ W.)	....do....	Nov. 2	8.00 p. m.	5–500*	....
D. 4629	Mariato Point, N. 70° E., 51 miles. (6° 55′ N., 81° 42′ 30″ W.)	....do....	Nov. 3	8.00 a. m.	50–800*	....
D. 4630	.....do.....................	......do....	Nov. 3	8.15 a. m.	556	gn. S ....
				8.59 a. m.	556	gn. S ....
D. 4631	Mariato Point, N. 51° E., 72 miles. (6° 26′ N., 81° 49′ W.)	......do....	Nov. 3	11.55 a. m.	774	gn. S ....
				12.58 p. m.	774	gn. S ....
D. 4632	Mariato Point, N. E., 118 miles. (5° 48′ N., 82° 16′ W.)	....	Nov. 3	8.00 p. m.	500–1,800*	....
H. 4805	5° 36′ N., 82° 28′ W	H. O. 1007; published Mar., 1887.	Nov. 3	10.37 p. m.	1,885	gn. M.............
D. 4633	4° 40′ N., 83° 25′ W	......do....	Nov. 4	8.00 a. m.	1,800–2,000*	....
D. 4634	4° 35′ 30″ N., 83° 32′ 30″ W	......do....	Nov. 4	10.55 a. m.	1,729	gn. M., Glob ......
				11.48 a. m.	1,729	gn. M., Glob ......

[a] While at anchor off Panama, between Oct. 23 and Nov. 1, collections were made along the shores of the islands of the Pacific Mail Steamship Company's station off Panama and the Taboga Islands. Plankton nets were used during the same periods about the anchorage and between there and the Taboga Islands.

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.			Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.		Direction.	Distance.	
°F.	°F.	°F.			h.	m.		mi.	
80–78	80–79	......	Pump-filter φ.	2 fms...	12	0	S. 60° E...	110.0	Distance from shore, 15 to 45 miles; off Gulf of Nicoya.
77	78	......	K. 1; K. 2 † ‖..	300 fms. to surface.		16	None......	......	
77	78	......	Surface 3......	Surface.		18	S. 65° E...	.6	
77	78	......	K. 1; K. 2 ‡...	Surface.		18	S. 65° E...	.6	
80–76	80–77	......	Pump-filter φ.	2 fms...	12	0	S. 58° E...	105.0	Distance from shore, 5 to 35 miles.
78–77	79–78	......	Surf. 3.......	Surface.	2	0	S. 65° E...	4.0	6 hauls, 20 minutes each; last landed at 9.24 p. m. Electric light used at first, third, and fifth hauls.
78	79	......	K. 1; K 2 ‡...	Surface.		20	S. 65° E...	.6	
77–79	78–79	......	Pump-filter φ.	2 fms...	13	0	S. 70° E... S. 7° E....	25.0 25.0	Distance from shore, 5 to 30 miles. Hove to off Jicaron Island part of night.
81	79	40.5	Luc. sdr......	......	......		None......	......	
83	79	40.5	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.		12	S. 10° E...	.3	Lost mud bag.
86	79	......	Luc. sdr......	......	......		None......	......	
85	79	......	8′ Alb.-Blk.; m.b.; 2 wng.	Bottom.		21	SW.......	.7	Trawl-net slightly torn.
80–87	78–81	......	Pump-filter φ.	2 fms...	11	0	S. 10° E... N. 63° E..	15.0 60.0	Distance from shore, 15 to 45 miles.
82	79	......	Surf. 3; e. 1....	Surface.		20	N. 65° E..	.7	
82	79	......	K. 1; K. 2 ‡...	Surface.		20	N. 65° E..	.7	
79–81	79–80	......	Pump-filter φ.	2 fms...	12	0	N. 70° E.. N. 5° E...	75.0 35.0	Distance from shore, 5 to 35 miles. Entering Gulf of Panama.
80–98	80–84	......	Pump-filter φ.	2 fms...	12	0	N.........	60.0	Distance from shore, ½ to 30 miles; Gulf of Panama.
82	82	......	Surf. 3; e. 1....	Surface.		20	S. 15° W..	.7	
82	82	......	K. 1; K. 2 ‡...	Surface.		20	S. 15° W..	.7	
91–82	82–83	......	Pump-filter φ.	2 fms...	11	0	S. 15° W..	100.0	Pump started at 9 a. m. at Panama; distance from shore, ½ to 30 miles; in Gulf of Panama.
82–78	81–79	......	Pump-filter φ.	2 fms...	12	0	S. 78° W..	120.0	Distance from shore, 3 to 30 miles; south coast of Panama.
79	81	40.5	Luc. sdr......	......	......		None......	......	
82	81	40.5	9′ Alb.-Blk.; m. b.; 2 wng.	Bottom.		19 32	SE....... NW......	.6 1.0	Trawl net came up afoul of frame.
85	82	38.0	Luc. sdr......	......	......		......	......	
87	82	38.0	9′ Alb.-Blk.; m. b.; 2 wng.	Bottom.		30	NW......	1.0	
88–80	83–79	......	Pump-filter φ.	2 fms...	12	0	S. 30° W..	75.0	Distance from shore, 20 to 120 miles.
79	80	36.4	Luc. sdr......	......	......		None......	......	
78–81	80–79	......	Pump-filter φ.	2 fms...	12	0	SW.......	100.0	Off shore.
79	80	35.9	Luc. sdr......	......	......		None......	......	
81	80	35.9	K. 1; K. 2; K. 3 †‖	300 fms. to surface.		19	None......	......	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Panama to Galapagos Islands—Cont'd.		1904.		*fms.*	
D. 4635	3° 52′ 30″ N., 84° 15′ W	H. O. 1007; published Mar., 1887.	Nov. 4	7.32 p. m.	1,700*	
				7.32 p. m.	1,700*	
				8.00 p. m.	1,700–1,800*	
H. 4806	3° 11′ 30″ N., 84° 57′ 30″ W	do	Nov. 5	3.17 a. m.	1,705	gn. M., Glob
D. 4636	2° 45′ N., 85° 25′ W	H. O. 526; published Jan., 1874; ext. cor. Oct., 1896.	Nov. 5	8.00 a. m.	1,500–1,700*	
				8.30 p. m.	1,500–1,600*	
D. 4637	1° 31′ N., 86° 32′ W	do	Nov. 5	9.32 p. m.	1,541	lt. gn. Oz., lge. Glob
				10.02 p. m.	1,541	lt. gn. Oz., lge. Glob
D. 4638	Mt. Pitt, Chatham Id., S. 60° W., 142 miles. (0° 27′ N., 87° 13′ W.)	H. O. 1798; published June, 1899.	Nov. 6	7.54 a. m.	1,450	bk. gy. glob. Oz
				8.00 a. m.	1,400–1,500*	bk. gy. glob. Oz
				8.53 a. m.	1,450	bk. gy. glob. Oz
				9.26 a. m.	1,450	bk. gy. glob. Oz
D. 4639	Mt. Pitt, Chatham Id., S. 67° W., 105 miles. (0° 04′ S., 87° 40′ W.)	do	Nov. 6	1.22 p. m.	1,418	lt. gy. glob. Oz
				1.44 p. m.	1,418	lt. gy. glob. Oz
				1.44 p. m.	1,418	lt. gy. glob. Oz
H. 4807	Mt. Pitt, Chatham Id., S. 74° W., 83 miles. (0° 21′ S., 87° 57′ 30″ W.)	do	Nov. 6	5.17 p. m.	1,433	gy. Oz
D. 4640	Mt. Pitt, Chatham Id., S. 86° W., 65 miles. (0° 40′ S., 88° 11′ W.)	do	Nov. 6	8.30 p. m.	1,000–1,500*	
				8.32 p. m.	1,061	
				8.32 p. m.	1,061	
				9.12 p. m.	1,061	(No specimen)
D. 4641	E. (Ripple) point, Hood Id., N. 41° W., 12 miles. (1° 35′ S., 89° 30′ W.)	do	Nov. 7	8.16 a. m	633	lt. gy. glob. Oz
				8.30 a. m.	600–1,000*	
				9.10 a. m.	633	lt. gy. glob. Oz
D. 4642	E. (Ripple) point, Hood Id., N. 41° W., 4 miles. (1° 30′ 30″ S., 89° 35′ W.)	do	Nov. 7	10.38 a. m.	300	brk. Sh., Glob
				11.15 a. m.	300	brk. Sh., Glob
D. 4643	W. (Hood) point, Hood Id., N. 24° E., 5 miles. (1° 29′ S., 89° 48′ 30″ W.)	do	Nov. 7	1.43 p. m.	100	brk. Sh., Glob
				2.14 p. m.	100	brk. Sh., Glob
	From Galapagos Islands to Sechura Bay, Peru.					
D. 4644	W. (Hood) point, Hood Id., N. 5° W., 49 miles. (2° 13′ S., 89° 42′ W.)	H. O. 1798; published June, 1899.	Nov. 7	8.03 p. m.	1,752	
				8.03 p. m.	1,752	
			Nov. 8	8.56 p. m.	1,752	fne. lt. gy. glob. Oz
D. 4645	3° 37′ 30″ S., 89° 43′ W	H. O. 823a; published July, 1882; ext. cor. Mar., 1896.		8.32 a. m.	1,955	fne. lt. gy. glob. Oz.
				10.45 a. m.	1,955	fne. lt. gy. glob. Oz.
D. 4646	4° 02′ S., 89° 16′ W	do	Nov. 8	7.05 p. m.	2,058	
				7.05 p. m.	2,058	
				7.27 p. m.	2,058	
				8.43 p. m.	2,058	lt. gy. and br. glob. Oz.

Cruise of the Albatross, 1904–5—Continued.

Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Apparatus.	Trial. Depth.	Trial. Duration.	Drift. Direction.	Drift. Distance.	Remarks.
°F.	°F.	°F.			h. m.		mi.	
79	79	......	Surf. 3; e. 1....	Surface.	22	SW......	.7	
79	79	......	K. 1; K. 2 ‡ ...	Surface.	22	SW......	.7	
83–78	80–79	......	Pump-filter φ.	2 fms...	12 0	SW......	70.0	Off shore.
77	78	36.4	Luc. sdr......			None.....		
78–77	78–78	......	Pump-filter φ.	2 fms...	12 0	SW......	100.0	Off shore.
80–76	78–76	......	Pump-filter φ.	2 fms...	12 30	S. 40° W..	100.0	Off shore; after this date no positions or stations were given for the pump-filter alone.
75	77	......	Luc. sdr......	....	....	None.....	......	Thermometer fouled.
74	77	......	K. 1; K. 2; K. 3 †‖	300 fms. to surface.	17	None.....	......	
73	75	......	Luc. sdr.....	....	....	None.....	......	Thermometer failed to trip.
75–73	77–75	......	Pump-filter φ.	2 fms...	11 30	S. 30° W..	75.0	Off shore.
73	75	......	K. 1; K. 2 † ..	300 fms. to surface.	32	None.....	......	With about 200 fms. line out, stopped heaving in for 15 minutes.
74	75	......	Surf. 3........	Surface.	10	SW......	.3	
77	76	35.4	Luc. sdr......					
77	76	35.4	Surf. 3........	Surface.	15	SW......	.5	
77	76	35.4	K. 1; K. 2 ‡...	Surface.	15	SW......	.5	
75	75	......	Luc. sdr......			None.....		
77–74	76–74	......	Pump-filter φ.	2 fms...	12 0	SW......	90.0	Distance from shore, 65 to 140 miles.
74	75	37.4	Surf. 3; e. 1...	Surface.	20	SW......	.7	
74	75	37.4	K. 1; K. 2 ‡...	Surface.	20	SW......	.7	
74	75	37.4	Luc. sdr......			None.....		
76	74	39.5	Luc. sdr......	....	....	None.....	......	E. (Ripple) point is the southern of the points on the east coast of Hood Id. embraced by the dotted line, abreast of the name and symbol of Ripple.
73–76	75–74	......	Pump-filter φ.	2 fms...	12 0	S. 55° W..	95.0	Distance from shore, 12 to 65 miles.[a]
75	74	39.5	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	20	NW......	.7	
74	74	48.6	Luc. sdr......	....	....	....	......	
75	74	48.6	8′ Alb.-Blk.; 2 wng.; 10 swabs.	Bottom.	20	E.........	.7	Full tangle set of 10 swabs on triangular frame locked to tail of trawl-net.
76	73	67.2	Luc. sdr......	....	....	....	......	W. (Hood) point is the northern of the two points in the off-lying rock symbols on the west coast of Hood Id.
76	73	67.2	8′ Alb.-Blk.; 2 wng.; 10 swabs.	Bottom.	15	NW......	.5	Gear rigged as in previous station; lost 1 swab.
72	72	35.4	Surf. 3; e. 1...	Surface.	23	S.........	.7	
72	72	35.4	K. 1; K. 2 ‡...	Surface.	23	S.........	.7	
72	72	35.4	Luc. sdr.....			None.....		
70	70	35.2	Luc. sdr......	....	....	....	......	
72	71	35.2	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	W........	1.0	
72	70	35.4	K. 3; e. 1......	Surface.	29	S. 80° E..	.9	
72	70	35.4	K. 1; K. 2 ‡...	Surface.	29	S. 80° E..	.9	
72	70	35.4	Surf. 3; 2 K. 2 §	300 fms. to surface.	20 19	S. 80° E.. None.....	.6	
72	70	35.4	Luc. sdr......	....	....	None.....	......	

[a] No detailed record of filter work was kept hereafter, though the custom of emptying the filter about 8 a. m. and 8 p. m. was continued until the arrival at Acapulco in Feb., 1905. Material collected from the filter was labeled with the numbers of stations occupied about these hours, or, in their absence, merely with the date and time.

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Galapagos Islands to Sechura Bay, Peru—Continued.		1904.		*fms.*	
D. 4647	4° 33′ S., 87° 42′ 30″ W	H. O. 823a; published July, 1882; ext. cor. Mar., 1896.	Nov. 9	8.28 a. m.	2,005	lt. gy. and br. glob. Oz.
				11.02 a. m.	2,005	lt. gy. and br. glob. Oz.
				2.28 p. m.	2,005	
				2.28 p. m.	2,005	
D. 4648	4° 43′ S., 87° 07′ 30″ W	do	Nov. 9	7.04 p. m.	2,000*	
				7.04 p. m.	2,000*	
				7.18 p. m.	2,000*	
D. 4649	5° 17′ S., 85° 20′ W	do	Nov. 10	8.30 a. m.	2,235	fne. stky. gy. M
				10.59 a. m.	2,235	fne. stky. gy. M
				2.17 p. m.	2,235	
				2.17 p. m.	2,235	
D. 4650	5° 21′ S., 84° 39′ W	do	Nov. 10	7.03 p. m.	2,200*	
				7.03 p. m.	2,200*	
				7.18 p. m.	2,200*	
D. 4651	Aguja Point, S. 83° E., 111 miles. (5° 42′ S., 83° W.)	H. O. 1177; published Dec., 1889; ext. cor. Nov., 1901.	Nov. 11	8.31 a. m.	2,222	fne. stk., gy. M
				10. 54 a. m.	2,222	fne. stk., gy. M
				2.13 p. m.	2,222	
				2.13 p. m.	2,222	
				2.13 p. m.	2,222	
				2.54 p. m.	2,222	
D. 4652	Aguja Point, S. 83° 30′ E., 91 miles. (5° 45′ S., 82° 40′ W.)	do	Nov. 11	7.03 p. m.	2,200*	
				7.03 p. m.	2,200*	
				7.19 p. m.	2,200*	
				8.20 p. m.	2,200*	
				9.04 p. m.	2,200*	
H. 4808	Aguja Point, S. 72° E., 36 miles. (5° 43′ 30″ S., 81° 44′ W.)	do	Nov. 12	7.36 a. m.	2,312	fne. bl. M
D. 4653	Aguja Point, S. 61° E., 17 miles. (5° 47′ S., 81° 24′ W.)	do	Nov. 12	10.33 a. m.	536	dk. br. vol. M
				11.17 a. m.	536	dk. br. vol. M
	From vicinity of Sechura Bay, Peru, seaward to ninetieth meridian W. long., thence to Callao, Peru.					
H. 4809	Aguja Point, S. 64° E., 20 miles. (5° 46′ 30″ S., 81° 27′ W.)	do	Nov. 12	1.10 p. m.	685	dk. gn. M
D. 4654	Aguja Point, S. 68° E., 24 miles. (5° 46′ S., 81° 32′ W.)	do	Nov. 12	2.03 p. m.	1,036	dk. br. M
				3.19 p. m.	1,036	dk. br. M
D. 4655	Aguja Point, N. 87° E., 40 miles. (5° 57′ 30″ S., 81° 50′ W.)	do	Nov. 12	7.04 p. m.	2,200*	
				7.04 p. m.	2,200*	
				7.22 p. m.	2,200*	

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
72	70	35.4	Luc. sdr			None		
74	71	35.4	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	E	1.0	
75	72	35.4	8 therm	Surface to 800 fms.		None		Temperatures at surface, 50, 100, 200, 300, 400, 600, and 800 fms.
75	72	35.4	K. 2 ‖	800 fms. to surface.	27	None		Attached below thermometers.
72	71		K. 3; e. l	Surface	17	E	.5	
72	71		2 K. 1 ‡	Surface	17	E	.5	
72	71		Surf. 3; 2 K. 2 §	300 fms. to surface.	20 16	E None	.6	
71	70	35.4	Luc. sdr			None		
73	71	35.4	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	E	1.0	
74	71	35.4	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
74	71	35.4	Wat. bot	800 fms		None		
71	71		K. 3; e. l	Surface	20	E	.7	
71	71		2 K. 1 ‡	Surface	20	E	.7	
71	71		Surf. 3; 2 K. 2 §	300 fms. to surface.	20 16	E None	.7	
69	67	35.4	Luc. sdr			None		
71	68	35.4	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	E	1.0	
72	68	35.4	9 therm	Surface to 800 fms.		None		Temperatures at surface 25, 50, 100, 200, 300, 400, 600, and 800 fms.
72	68	35.4	Wat. bot	800 fms.		None		
72	68	35.4	K. 2 ‖	800 fms. to surface.	23	None		Attached below thermometers.
70	68	35.4	8 therm	5 to 100 fms.		None		Temperatures at 5, 10, 20, 30, 40, 50, 75, and 100 fms.
69	66		K. 3; e. l	Surface	20	E	.7	
69	66		2 K. 1 ‡	Surface	20	E	.7	
69	66		Surf. 3; 2 K. 2 §	400 fms. to surface.	20 16	E None	.7	
68	66		Surf. 3; 2 K. 2 §	200 fms. to surface.	20 9	E None	.7	
68	66		Surf. 3; 2 K. 2 §	100 fms. to surface.	20 4	E None	.7	
65	64	34.9	Luc. sdr			None		
66	65	41.3	Luc. sdr					
66	65	41.3	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	S	1.0	
66	63	38.5	Luc. sdr			None		
66	64	37.3	Luc. sdr			None		
66	64	37.3	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	SE	1.0	
66	64		K. 3; e. l	Surface	20	SW	.7	
66	64		2 K. 1 ‡	Surface	20	SW	.7	
66	64		Surf. 3; 2 K. 2 §	400 fms. to surface.	20 18	SW None	.7	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From vicinity of Sechura Bay, Peru, seaward to ninetieth meridian W. long., thence to Callao, Peru—Continued.					
			1904.		*fms.*	
D. 4656	6° 55′ S., 83° 34′ W	H. O. 823a; published July, 1882; ext. cor. Mar., 1896.	Nov. 13	8.30 a. m.	2,222	fne. gn. M., mang. Nod.
				11.13 a. m.	2,222	fne. gn. M., mang. Nod.
D. 4657	7° 12′ 30″ S., 84° 09′ W	do	Nov. 13	7.03 p. m.	2,200*	
				7.03 p. m.	2,200*	
				7.20 p. m.	2,200*	
D. 4658	8° 30′ S., 85° 36′ W	do	Nov. 14	8.29 a. m.	2,370	fne. gn. M., mang. Nod.
				11.03 a. m.	2,370	fne. gn. M., mang. Nod.
				2.16 p. m.	2,370	
D. 4659	8° 55′ S., 86° 05′ W	do	Nov. 14	7.02 p. m.	2,400*	
				7.03 p. m.	2,400*	
				7.49 p. m.	2,400*	
D. 4660	9° 55′ S., 87° 30′ W	do	Nov. 15	8.33 a. m.	2,425	mang. Nod
				11.02 a. m.	2,425	mang. Nod
D. 4661	10° 17′ S., 88° 02′ W	do	Nov. 15	7.04 p. m.	2,400*	
				7.04 p. m.	2,400*	
				7.18 p. m.	2,400*	
D. 4662	11° 14′ S., 89° 35′ W	do	Nov. 16	8.33 a. m.	2,439	(No specimen)
				11.13 a. m.	2,439	Rough
				2.07 p. m.	2,439	
				2.07 p. m.	2,439	
				2.07 p. m.	2,439	
D. 4663	11° 20′ S., 88° 55′ W	do	Nov. 16	7.03 p. m.	2,400*	
				7.03 p. m.	2,400*	
				7.18 p. m.	2,400*	
D. 4664	11° 30′ S., 87° 19′ W	do	Nov. 17	8.10 a. m.	2,500*	
				8.10 a. m.	2,500*	
				8.21 a. m.	2,500*	
				9.18 a. m.	2,500*	
D. 4665	11° 45′ S., 86° 05′ W	do	Nov. 17	7.02 p. m.	2,500*	
				7.02 p. m.	2,500*	
				7.16 p. m.	2,500*	
D. 4666	11° 55′ S., 84° 20′ W	do	Nov. 18	8.35 a. m.	2,600	fne. gy. rad. Oz
				11.25 a. m.	2,600	fne. gy. rad. Oz
				2.25 p. m.	2,600	fne. gy. rad. Oz
				2.25 p. m.	2,600	fne. gy. rad. Oz
				2.25 p. m.	2,600	fne. gy. rad. Oz
D. 4667	12° S., 83° 40′ W	do	Nov. 18	7.01 p. m.	2,600*	
				7.01 p. m.	2,600*	
				7.15 p. m.	2,600*	

Cruise of the Albatross, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
69	69	35.2	Luc. sdr			None		
73	70	35.2	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	N. 60° E	1.0	
70	69		K. 3; c. 1	Surface	20	SW	.7	
70	69		2 K. 2 ‡	Surface	20	SW	.7	
70	69		Surf. 3; 2 K. 2 §	300 fms. to surface.	20 14	SW None	.7	
71	70	35.3	Luc. sdr			None		
75	70	35.3	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	30	N. 60° E	1.0	
79	72	35.3	Tnr. int. §	300 fms. to surface.	26 9	SW None	.8	Net was not closed through fouling of pursing lines.
70	71		2 K. 1 ‡	Surface	21	SW	.7	
70	71		K. 3; c. 1	Surface	20	SW	.7	
70	70		Int. 1; 2 K. 2 §.	300 fms. to surface.	20 13	SW None	.7	
71	69	35.4	Luc. sdr			None		
74	73	35.4	6′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	32	N. 60° E	1.0	Bridle stops parted; net capsized and slightly torn.
69	69		Surf. 3; c. 1	Surface	20	NE	.7	
69	69		2 K. 1 ‡	Surface	20	NE	.7	
69	69		Int. 1; 2 K. 2 §.	300 fms. to surface.	21 15	NE None	.7	
70	69	35.2	Luc. sdr			None		Bottom probably of manganese.
74	69	35.2	6′ Alb.-Blk.; 2 wng.	Bottom.	15	N. 60° E	.5	Bridle stops parted; trawl net capsized.
73	70	35.2	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
73	70	35.2	Wat. bot	800 fms.		None		
73	70	35.2	K. 1 ‖	800 fms. to surface.	23	None		Attached below thermometers.
69	69		Surf. 3; c. 1	Surface	20	E	.7	
69	69		2 K. 1 ‡	Surface	20	E	.7	
69	69		Int. 1; 2 K. 2 §.	300 fms. to surface.	20 13	E None	.7	
69	68		Surf. 3	Surface	20	E	.7	
69	68		2 K. 1 ‡	Surface	20	E	.7	
69	68		Int. 1; 2 K. 2 §.	300 fms. to surface.	20 13	E None	.7	
71	68		Tnr. int §	300 fms. to surface.	25 13	E None	.8	Net was not closed through fouling of pursing lines.
69	68		Surf. 3; c. 1	Surface	21	E	.7	
69	68		2 K. 1 ‡	Surface	21	E	.7	
69	68		Int. 1; 2 K. 2 §.	300 fms. to surface.	20 12	E None	.7	
68	67	34.9	Luc. sdr			None		
71	69	34.9	6′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	11	E	.3	
72	69	34.9	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
72	69	34.9	Wat. bot	800 fms.		None		
72	69	34.9	K. 1 ‖	800 fms. to surface.	23	None		Attached below thermometers.
68	68		Surf. 3; c. 1	Surface	20	E	.7	
68	68		2 K. 1 ‡	Surface	20	E	.7	
68	68		Int. 1; 2 K. 2 §.	300 fms. to surface.	20 13	E None	.7	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From vicinity of Sechura Bay, Peru, seaward to ninetieth meridian W. long., thence to Callao, Peru—Continued.					
			1904.		*fms.*	
D. 4668	12° 09′ S., 81° 45′ W........	H. O. 823a; published July, 1882; ext. cor. Mar., 1896.	Nov. 19	8.30 a. m.	2,620	fne. gy. glob. and rad. Oz.
				9.11 a. m.	2,620	{fne gy. glob. and rad. Oz.
D. 4669	12° 13′ S., 80° 25′ W........	.....do....	Nov. 19	7.00 p. m.	2,600*	....
				7.00 p. m.	2,600*	....
				7.17 p. m.	2,600*	....
D. 4670	Palominos Lt. Ho., E., 105 miles. (12° 09′ S., 79° 02′ 30″ W.)	H. O. 1178; published Feb., 1890.	Nov. 20	7.46 a. m.	3,209	fne. dk. br. M.....
				11.02 a. m.	3,209	fne. dk. br. M.....
				2.49 p. m.	3,209	....
				2.49 p. m.	3,209	....
				2.49 p. m.	3,209	....
D. 4671	Palominos Lt. Ho., S. 89° E., 71 miles. (12° 07′ S., 78° 28′ W.)	.....do....	Nov. 20	7.01 p. m.	1,490	....
				7.01 p. m.	1,490	....
				7.16 p. m.	1,490	....
				8.10 p. m.	1,490	fne. dk. gn. C.....
D. 4672	Palominos Lt. Ho., NE., 88 miles. (13° 11′ 30″ S., 78° 18′ W.)	.....do....	Nov. 21	7.32 a. m.	2,845	fne. dk. br. inf. M.
				10.15 a. m.	2,845	fne. dk. br. inf. M.
				1.24 p. m.	2,845	....
D. 4673	Palominos Lt. Ho., N. 57° E., 40 miles. (12° 30′ 30″ S., 77° 49′ 30″ W.)	.....do....	Nov. 21	7.01 p. m.	458	....
				7.01 p. m.	458	....
				7.16 p. m.	458	....
				7.59 p. m.	458	R................
H. 4810	Palominos Lt. Ho., N. 77° E., 79 miles. (12° 26′ 30″ S., 78° 34′ 30″ W.)	.....do....	Nov. 22	7.26 a. m.	1,949	fne. dk. gn. M.....
D. 4674	Palominos Lt. Ho., N. 86° E., 86 miles.	.....do....	Nov. 22	9.44 a. m.	2,338	fne. dk. gn. M.....
	(12° 14′ 30″ S., 78° 43′ 30″ W.)			12.10 p. m.	2,338	fne. dk. gn. M., R.
D. 4675	Palominos Lt. Ho., N. 60° E., 89 miles. (12° 54′ S., 78° 33′ W.)	.....do....	Nov. 22	7.01 p. m.	3,120	....
				7.01 p. m.	3,120	....
				7.16 p. m.	3,120	....
				8.27 p. m.	3,120	fne. dk. gn. M.....
	From Callao, Peru, to Easter Island.					
H. 4811	13° 48′ S., 80° 13′ W.......	H. O. 823a; published July, 1882; ext. cor. Mar., 1896.	Dec. 4	7.26 p. m.	2,543	fne. lt. gy. Oz.....
D. 4676	14° 29′ S., 81° 24′ W........	.....do....	Dec. 5	8.29 a. m.	2,714	fne. dk. br. Oz....
				11.15 a. m.	2,714	fne. dk. br. Oz., R.
				·312 p. m.	2,714	fne. dk. br. Oz., R.
				3.12 p. m.	2,714	fne. dk. br. Oz., R.

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
68	67	....	Luc. sdr			None		
69	68	......	Tnr. int §	300 fms. to surface.	37 11	E None	1.0	Middle of bag of net pursed up tight before hoisting to surface.
68	67	......	Surf. 3; c. 1	Surface	20	E	.7	
68	67	......	2 K. 1 ‡	Surface	20	E	.7	
68	67	......	Int. 1; 2 K. 2 §	300 fms. to surface.	20 14	E None	.7	
68	66	35.4	Luc. sdr			None		
73	67	35.4	6′ Alb.-Blk.; m. b.; 2 wng.	Bottom	16	S	.5	
70	68	35.4	9 therm	Surface to 800 fms.	......	None	......	Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
70	68	35.4	Wat. bot	800 fms.	......	None	......	
70	68	35.4	K. 1	800 fms. to surface.	25	None		Attached below thermometers.
67	66	35.4	Surf. 3; c. 1	Surface	20	E	.7	
67	66	35.4	2 K. 1 ‡	Surface	20	E	.7	
67	66	35.4	Int. 1; 2 K. 2 §	300 fms. to surface.	20 13	E None	.7	
67	66	35.4	Luc. sdr			None		"Silicious infusorial earth."—A. A.
66	66	35.2	Luc. sdr			None		
69	67	35.2	6′ Alb.-Blk.; m. b.; 2 wng.	Bottom	20	E	.6	
73	67	35.2	Tnr. int. §	300 fms. to surface.	32 12	N. 20° E. None	10	Middle of bag of net pursed up tight before hoisting to surface.
71	67	42.5	Surf. 3; c. 1	Surface	20	N. 30° E.	.7	
71	67	42.5	2 K. 1 ‡	Surface	20	N. 30° E.	.7	
71	67	42.5	Int. 1; 2 K. 2 §	300 fms. to surface.	20 16	N. 30° E. None	.7	
70	67	42.5	Luc. sdr			None		
67	67	35.2	Luc. sdr			None		
70	68	35.1	Luc. sdr			None		
69	68	35.1	6′ Alb.-Blk.; m. b.; 2 wng.	Bottom	21	N	.7	Bridle stops parted; trawl net capsized; catch lost; net also badly torn.
67	68	......	Surf. 3; c. 1	Surface	20	N	.7	
67	68	......	2 K. 1. ‡	Surface	20	N	.7	
67	68	......	Int. 1; 2 K. 2 §	300 fms. to surface.	20 15	N None	.7	
67	68	......	Luc. sdr			None		
70	70	35.2	Luc. sdr			None		
71	69	35.4	Luc. sdr			None		
73	70	35.4	6′ Alb.-Blk.; m. b.; 2 wng.	Bottom	22	NE	.4	Bottom very rough. Lost beam-trawl frame and wing nets; recovered mud bag and fragments of trawl net.
70	69	35.4	9 therm	Surface to 800 fms.	......	None	......	Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
70	69	35.4	Wat. bot	800 fms.	......	None	......	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Callao, Peru, to Easter Island—Con.					
			1904.		*fms.*	
D. 4676	14° 20′ S., 80° 24″ W	H. O 823a; published July, 1882; ext. cor. Mar., 1896.	Dec. 5	3.12 p. m	2,714	fne. dk. br. Oz., R.
				3.53 p. m.	2,714	fne. dk. br. Oz., R.
D. 4677	14° 37′ 30″ S., 81° 41′ W....	.....do....	Dec. 5	7.18 p. m.	2,700*	....
				7.18 p. m.	2,700*	....
H. 4812	15° 39′ S., 83° 27′ 30″ W....	.....do....	Dec. 6	8.31 a. m.	2,620	lt. br. rad. Oz....
D. 4678	16° 31′ S., 85° 04′ W........	.....do....	Dec. 6	7.30 p. m.	2,500*	....
				7.30 p. m.	2,500*	....
D. 4679	17° 26′ S., 86° 46′ W........	.....do....	Dec. 7	8.26 a. m.	2,485	lt. br. rad. Oz....
				9.21 a. m.	2,485	lt. br. rad. Oz....
				11.15 a. m.	2,485	lt. br. rad. Oz....
D. 4680	17° 55′ S., 87° 42′ W........	.....do....	Dec. 7	7.29 p. m.	2,400*	....
				7.29 p. m.	2,400*	....
D. 4681	18° 47′ S., 89° 26′ W........	.....do....	Dec. 8	8.27 a. m.	2,395	lt. br. rad. Oz....
				9.20 a. m.	2,395	lt. br. rad. Oz....
				11.36 a. m.	2,395	lt. br. rad. Oz....
				2.34 p. m.	2,395	lt. br. rad. Oz....
				2.34 p. m.	2,395	lt. br. rad. Oz....
				2.34 p. m.	2,395	lt. br. rad. Oz....
D. 4682	19° 07′ 30″ S., 90° 10′ W....	.....do....	Dec. 8	7.32 p. m.	2,400*	....
				7.32 p. m.	2,400*	....
D. 4683	20° 02′ 30″ S., 91° 52′ 30″ W.	.....do....	Dec. 9	8.29 a. m.	2,385	dk. choc. rd. rad. Oz.
				9.27 a. m.	2,385	dk. choc. rd. rad. Oz.
				10.21 a. m.	2,385	dk. choc. rd. rad. Oz.
				10.21 a. m.	2,385	dk. choc. rd. rad. Oz.
D. 4684	20° 40′ S., 93° 19′ W........	.....do....	Dec. 9	7.30 p. m.	2,300*	....
				7.30 p. m.	2,300*	....
D. 4685	21° 36′ S., 94° 56′ W........	.....do....	Dec. 10	8.23 a. m.	2,205	dk. choc. rd. rad Oz.
				9.15 a. m.	2,205	dk. choc. rd. rad. Oz.
				10.24 a. m.	2,205	dk. choc. rd. rad. Oz.
				10.24 a. m.	2,205	dk. choc. rd. rad. Oz.
				10.24 a. m.	2,205	dk. choc. rd. rad. Oz.
				12.11 p. m.	2,205	dk. choc. rd. rad. Oz.
D. 4686	22° 02′ S., 95° 52′ W........	.....do....	Dec. 10	7.32 p. m.	2,200*	....
				7.32 p. m.	2,200*	....
D. 4687	22° 50′ S., 97° 30′ W........	.....do....	Dec. 11	8.25 a. m.	2,184	dk. choc. rd. rad. Oz.
				9.13 a. m.	2,184	dk. choc. rd. rad. Oz.
				11.09 a. m.	2,184	dk. choc. rd. rad. Oz.
D. 4688	23° 17′ S., 98° 37′ 30″ W....	....	Dec. 11	7.32 p. m.	2,100*	....
				7.32 p. m.	2,100*	....

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
70	69	35.4	K. 1 ‖	800 fms. to surface.	24	None		Attached below thermometers.
71	70	35.4	Surf. 3; 2 K. 2 §.	300 fms. to surface.	20 14	W None	.7	
69	68		Surf. 3; e. l.	Surface.	15	W	.5	
69	68		K. 1; K. 2 ‡	Surface.	15	W	.5	
71	69	35.2	Luc. sdr.					
68	69		Surf. 3; e. l.	Surface.	20	SW	.6	
68	69		2 K. 1 ‡	Surface.	20	SW	.6	
69	69	35.3	Luc. sdr.					
69	68	35.3	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 15	N. 60° E. None	.7	
73	68	35.3	10 swabs	Bottom.	20	N. 60° E.	.6	
69	68		Surf. 3; e. l.	Surface.	20	SW	.7	
69	68		2 K. 1 ‡	Surface.	20	SW	.7	
68	68	35.4	Luc. sdr.					
69	69	35.4	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 14	N. 60° E. None	.7	
72	70	35.4	5½′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	10	N. 60° E.	.3	Trawl net badly torn; one leg of bridle parted.
70	70	35.4	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
70	70	35.4	Wat. bot.	800 fms.		None		
70	70	35.4	K. 1 ‖	800 fms. to surface.	21	None		Attached below thermometers.
69	69		Surf. 3; e. l.	Surface.	20	SW	.7	
69	69		2 K. 1 ‡	Surface.	20	SW	.7	
72	70	35.2	Luc. sdr.			None		
72	70	35.2	Int. 1.; 2 K. 2 §.	300 fms. to surface.	20 14	W None	.7	
76	71	35.2	9 therm	Surface to 200 fms.		None		Temperatures at surface, 25, 50, 75, 100, 125, 150 175, and 200 fms.
76	71	35.2	Wat. bot.	200 fms.		None		
71	72		Surf. 3; e. l.	Surface.	20	SW	.7	
71	72		2 K. 1 ‡	Surface.	20	SW	.7	
80	72	35.3	Luc. sdr.			None		
79	71	35.3	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 17	N None	.7	
78	71	35.3	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
78	71	35.3	Wat. bot.	800 fms.		None		
78	71	35.3	K. 1 ‖	800 fms. to surface.	22	None		Attached below thermometers.
74	71	35.3	5½′ Alb.-Blk. spl.; m. b.; 2 wng.	Bottom.	15	S. 25° E.	.4	
71	71		Surf. 3; e. l.	Surface.	20	SW	.7	
71	71		K. 1; K. 2 ‡	Surface.	20	SW	.7	
84	73	35.4	Luc. sdr.	None.				
84	73	35.4	Cuhn; 2 K. 2 §.	300 fms. to surface.	20 16	SW None	.7	
79	74	35.4	Int. 1; 2 K. 2 §.	1,800 to 2,000 fms.	21 1 15	SW None	.7	Towed near bottom.
72	72		Surf. 3; e. l.	Surface.	21	SW	.7	
72	72		K. 1; K. 2 ‡	Surface.	21	SW	.7	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Callao, Peru, to Easter Island—Con.					
			1904.		*fms.*	
D. 4689	24° 05′ S., 100° 20′ W	H. O. 823a; published July, 1882; ext. cor., Mar. 1896.	Dec. 12	8.25 a. m.	2,185	dk. choc. rd. rad. Oz.
				9.14 a. m.	2,185	dk. choc. rd. rad. Oz.
				10.23 a. m.	2,185	dk. choc. rd. rad. Oz.
				10.23 a. m.	2,185	dk. choc. rd. rad. Oz.
				10.23 a. m.	2,185	dk. choc. rd. rad. Oz.
D. 4690	24° 45′ S., 101° 45′ W	do	Dec. 12	7.30 p. m.	2,000*	
				7.30 p. m.	2,000*	
D. 4691	NW. point, Sala y Gomez Id.; S. 60° W. 122 miles. (25° 27′ S., 103° 29′ W.)	Referred to H. O. 1119; published Dec., 1888; ext. cor. Nov., 1904.	Dec. 13	8.23 a. m.	1,939	lt. br. glob. Oz
				9.06 a. m.	1,939	lt. br. glob. Oz
				11.02 a. m.	1,939	lt. br. glob. Oz., R.
D. 4692	NW. point, Sala y Gomez Id.; S. 59° W., 91 miles. (25° 40′ 30″ S., 104° 01′ W.)	do	Dec. 13	7.30 p. m.	1,500*	
				7.30 p. m.	1,500*	
H. 4813	NW. point, Sala y Gomez Id.; S. 15° W., 10.5 miles. (26° 17′ 30″ S., 105° 25′ W.)	do	Dec. 14	8.12 a. m.	885	R
D. 4693	NW. point, Sala y Gomez Id.; N. 82° E., 15 miles. (26° 30′ 00″ S., 105° 45′ W.)	do	Dec. 14	11.21 a. m.	1,142	mang. Nod
				12.29 p. m.	1,142	mang. Nod., R.
H. 4814	Cape Roggewein, Easter Id.; S. 79° W., 95 miles. (26° 50′ S., 107° 30′ W.)	do	Dec. 15	2.25 a. m.	1,696	rky (no specimen).
H. 4815	Cape Roggewein, S. 67° W., 18 miles. (27° 01′ 30″ S., 108° 56′ W.)	do	Dec. 15	1.13 p. m.	1,552	vol. R., Glob
	From Easter Island to Galapagos Islands.[a]					
H. 4816	North Cape, Easter Id., S. 26° W., 7 miles. (26° 59′ S., 109° 20′ W.)	Referred to H. O. 1119; published Dec., 1888; ext. cor., Nov., 1904.	Dec. 22	11.15 a. m.	1,145	fne. vol. S., few For.
H. 4817	North Cape, S. 31° W., 12 miles. (26° 55′ S., 109° 16′ 30″ W.)	do	Dec. 22	12.40 p. m.	1,627	vol. S
H. 4818	North Cape, S. 35° W., 17.5 miles. (26° 51′ S., 109° 12′ 30″ W.)	do	Dec. 22	2.13 p. m.	1,733	lt. br. Oz., Glob.
				3.41 p. m.	1,733	lt. br. Oz., Glob
				3.41 p. m.	1,733	lt. br. Oz., Glob.
				3.41 p. m.	1,733	lt. br. Oz., Glob.
H. 4819	North Cape, S. 35° W., 21.5 miles. (26° 47′ 30″ S., 109° 09′ 30″ W.)	do	Dec. 22	5.09 p. m.	1,770	fne. lt. br. vol. M., Glob.
D. 4694	North Cape, S. 36° W., 39 miles. (26° 34′ S., 108° 57′ 30″ W.)	do	Dec. 22	7.58 p. m.	1,800*	
				7.58 p. m.	1,800*	
D. 4695	North Cape, S. 41° W., 135 miles. (25° 22′ 30″ S., 107° 45′ W.)	do	Dec. 23	8.29 a. m.	2,020	lt. br. vol. Oz
				9.12 a. m.	2,020	lt. br. vol. Oz
				11.38 a. m.	2,020	lt. br. vol. Oz

[a] Small shore collections were made at Easter Island while the ship was coaling.

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
81	72	35.4	Luc. sdr.	None.				
75	72	35.4	Int. 1; 2 K. 2 §.	300 fms. to surface.	21 14	SW None	.7	
81	74	35.4	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
81	74	35.4	Wat. bot.	800 fms.		None		
81	74	35.4	K. 1 ‖	800 fms. to surface.	14	None		Attached below thermometers.
73	75	......	Surf. 3; e. l.	Surface.	20	SW	.6	
73	75	......	K. 1; K. 2 ‡	Surface.	20	SW	.6	
78	73	(?)	Luc. sdr.	None.				Bottom thermometer registered 32.4° F. (?).
74	74	......	Int. 1; 2 K. 2. §.	300 fms. to surface.	20 14	SW None	.7	
86	73	......	8′ Alb.-Blk.; m. b.; 2 wng.	Bottom.	15	SW	.4	Lost beam-trawl frame and 2 wing nets; trawl net wrecked.
73	72	......	Surf. 3; e. l.	Surface.	20	SW	.6	
73	72	......	K. 1; K. 2 ‡	Surface.	20	SW	.6	
71	71	36.4	Luc. sdr.	None.				
75	73	35.4	Luc. sdr.	None.				
75	72	35.4	5½′ Alb.-Blk. spl. m. b.; 2 wng.	Bottom.	10	NE	.3	Bridle stops of beam trawl parted; net capsized and slightly torn. Lost one wing net; mud-bag frame broken.
71	71	35.4	Luc. sdr.	None.				
78	74	35.4	Luc. sdr.			None		
77	72	35.5	Luc. sdr.			None		
76	74	35.4	Luc. sdr.			None		
77	74	35.4	Luc. sdr.			None		
75	75	35.4	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
75	75	35.4	Wat. bot.	800 fms.		None		
75	75	35.4	K. 1 ‖	800 fms. to surface.	19	None		Attached below thermometers.
78	75	35.3	Luc. sdr.			None		
73	73	......	Int. 1; e. l.	Surface.	20	N. 20° E.	.6	
73	73	......	2 K. 1 ‡	Surface.	20	N. 20° E.	.6	
75	74	......	Luc. sdr.			None		Wire parted while reeling in; lost instruments.
75	75	......	Int. 1; 2 K. 2§.	300 fms. to surface.	20 14	S. None	.7	
79	75	......	5½′ Alb.-Blk. spl.; m. b.; 2 wng.	Bottom.	26	SW	.8	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Easter Island to Galapagos Islands—Continued.		1904.		*fms.*	
D. 4696	24° 40′ S., 107° 05′ W	H.O. 823a; published July, 1882; ext. cor., Mar., 1896.	Dec. 23	7.45 p. m.	2,000*	
				7.45 p. m.	2,000*	
D. 4697	23° 25′ S., 106° 02′ W	do	Dec. 24	8.31 a. m.	2,188	rd. C
				9.21 a. m.	2,188	rd. C
				11.36 a. m.	2,188	rd. C., R
D. 4698	22° 50′ S., 105° 32′ W	do	Dec. 24	7.46 p. m.	2,100*	
				7.46 p. m.	2,100*	
D. 4699	21° 40′ S., 104° 30′ W	do	Dec. 25	8.27 a. m.	2,168	rd. C
				9.21 a. m.	2,168	rd. C
D. 4700	20° 29′ S., 103° 26′ W	do	Dec. 25	7.48 p. m.	2,200*	
				7.48 p. m.	2,200*	
D. 4701	19° 11′ 30″ S., 102° 24′ W	do	Dec. 26	8.29 a. m.	2,265	rd. C
				9.18 a. m.	2,265	rd. C
				11.39 a. m.	2,265	rd. C
				2.28 p. m.	2,265	rd. C
				2.28 p. m.	2,265	rd. C
				2.28 p. m.	2,265	rd. C
D. 4702	18° 40′ S., 102° W	do	Dec. 26	7.46 p. m.	2,200*	
				7.46 p. m.	2,200*	
D. 4703	17° 19′ S., 100° 52′ 30″ W	do	Dec. 27	8.23 a. m.	2,228	rd. C
				9.10 a. m.	2,238	rd. C
				11.29 a. m.	2,238	rd. C
D. 4704	16° 55′ S., 100° 25′ W	do	Dec. 27	7.45 p. m.	2,200*	
				7.45 p. m.	2,200*	
D. 4705	15° 05′ S., 99° 19′ W	do	Dec. 28	8.25 a. m.	2,031	lt. yl. br. glob. Oz.
				9.11 a. m.	2,031	lt. yl. br. glob. Oz.
				11.26 a. m.	2,031	lt. yl. br. glob. Oz.
D. 4706	14° 19′ S., 98° 46′ W	do	Dec. 28	7.48 p. m.	2,000*	
				7.48 p. m.	2,000*	
D. 4707	12° 53′ S., 97° 42′ W	do	Dec. 29	8.26 a. m.	2,120	rd. C
				9.12 a. m.	2,120	rd. C
				10.20 a. m.	2,120	rd C
				10.20 a. m.	2,120	rd. C
				10.20 a. m.	2,120	rd. C
D. 4708	11° 40′ S., 96° 55′ W	do	Dec. 29	7.45 p. m.	2,100*	
				7.45 p. m.	2,100*	
D. 4709	10° 15′ S., 95° 41′ W	do	Dec. 30	8.23 a. m.	2,035	glob. Oz
				9.12 a. m.	2,035	glob. Oz
				11.25 a. m.	2,035	glob. Oz
D. 4710	9° 30′ S., 95° 08′ W	do	Dec. 30	7.46 p. m.	2,000*	
				7.46 p. m.	2,000*	

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
75	74		Surf. 4; e. l.	Surface	20	SW	.6	
75	74		2 K. 1 ‡	Surface	20	SW	.6	
77	75	36.4	Luc. sdr			None		
77	75	36.4	Int. 1; 2 K. 2 §	300 fms. to surface.	20 15	NW None	.7	
80	75	36.4	5½′ Alb.-Blk. spl.; m. b.; 2 wng.	Bottom.	21	NW	.7	Bridle stops parted; trawl net capsized.
76	75		Surf. 4; e. l.	Surface	20	N. 20° E	.6	
76	75		2 K. 1 ‡	Surface	20	N. 20° E	.6	
76	75	35.5	Luc. sdr			None		
76	75	35.5	Int. 1; 2 K. 2 §	300 fms. to surface.	20 15	N. 20° E None	.7	
75	74		Surf. 4; e. l.	Surface	30	N. 20° E	.9	
75	74		2 K. 1 ‡	Surface	30	N. 20° E	.9	
75	72	35.3	Luc. sdr			None		
79	74	35.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 18	N. 20° E None	.7	
79	75	35.3	8′ Tnr.; m. b.; 2 wng.	Bottom.	20	N. 20° E	.7	
77	75	35.3	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400 600, and 800 fms.
77	75	35.3	Wat. bot	800 fms.		None		
77	75	35.3	K. 1 ‖	800 fms. to surface.	23	None		Attached below thermometers.
75	73		Surf. 4; e. l.	Surface	20	N. 20° E	.6	
75	73		2 K. 1 ‡	Surface	20	N. 20° E	.6	
72	73	35.3	Luc. sdr			None		
75	73	35.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 15	NE None	.7	
77	74	35.3	8′ Tnr.; m. b.; 2 wng.	Bottom.	30	NE	1.0	
73	73		Surf. 4; e. l.	Surface	20	N. 20° E	.6	
73	73		2 K. 1 ‡	Surface	20	N. 20° E	.6	
75	72	35.3	Luc. sdr			None		
75	72	35.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 15	NE None	.7	
75	71	35.3	8′ Tnr.; m. b.; 2 wng.	Bottom.	20	NE	.7	
73	72		Surf. 4; e. l.	Surface	20	N. 20° E	.6	
73	72		2 K. 1 ‡	Surface	20	N. 20° E	.6	
73	72	35.3	Luc. sdr			None		
74	72	35.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 14	NNE None	.7	
74	72	35.3	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
74	72	35.3	Wat. bot	800 fms.		None		
74	72	35.3	K. 1 ‖	800 fms. to surface.	24	None		Attached below thermometers.
73	72		Surf. 4; e. l.	Surface	20	N. 20° E	.6	
73	72		2 K. 1 ‡	Surface	20	N. 20° E	.6	
72	72	35.3	Luc. sdr			None		
73	72	35.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 16	NE None	.7	
76	73	35.3	8′ Tnr.; m. b.; 2 wng.	Bottom.	20	NE	.7	
74	74		Surf. 4; e. l.	Surface	20	NE	.6	
74	74		2 K. 1 ‡	Surface	20	NE	.6	

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Easter Island to Galapagos Islands—Continued.					
			1904.		*fms.*	
D. 4711	7° 47′ 30″ S., 94° 05′ W	H. O. 823a; published July, 1882; ext. cor., Mar., 1896.	Dec. 31	8.27 a. m.	2,240	glob. Oz..........
				9.34 a. m.	2,240	glob. Oz..........
				9.34 a. m.	2,240	glob. Oz..........
				9.34 a. m.	2,240	glob. Oz..........
				10.16 a. m.	2,240	glob. Oz ....
				12.30 p. m.	2,240	glob. Oz ....
D. 4712	7° 05′ S., 93° 35′ W..........	.....do.....	Dec. 31	7.48 p. m.	2,200*	....
				7.48 p. m.	2,200*	....
			1905			
D. 4713	5° 35′ S., 92° 22′ W	.....do....	Jan. 1	8.26 a. m.	2,191	glob. Oz..........
				9.14 a. m.	2,191	glob. Oz..........
				9.14 a. m.	2,191	glob. Oz..........
				9 14 a.m.	2,191	glob. Oz ....
				9.36 a. m.	2,191	glob. Oz..........
D. 4714	4° 19′ S., 91° 28′ W..........	.....do.....	Jan. 1	7.45 p. m.	2,000*	....
				7.45 p. m.	2,000*	....
D. 4715	W. (Hood) point, Hood Id., N. 23° E., 83 miles. (2° 40′ 30″ S., 90° 19′ 00″ W.)	H. O. 1798; published June, 1899.	Jan. 2	8.18 a. m.	1,743	glob. Oz..........
				9.15 a. m.	1,743	glob. Oz..........
				9.15 a. m.	1,743	glob. Oz..........
				9.15 a. m.	1,743	glob. Oz..........
				9.52 a. m.	1,743	glob. Oz..........
				12.04 p. m.	1,743	glob. Oz..........
D. 4716	W. (Hood) point, Hood Id., N. 17° E., 57 miles. (2° 18′ 30″ S., 90° 02′ 30″ W.)	.....do.....	Jan. 2	7.33 p. m.	1,700*	....
				7.33 p. m.	1,700*	....
				7.53 p. m.	1,700*	....
	From Galapagos Islands to Manga Reva, Paumotu Group.[a]					
H. 4820	S. point, Charles Id., N. 76° E., 38 miles. (1° 31′ S., 91° 04′ W.)	H. O. 1798; published June, 1899.	Jan. 10	7.23 p. m.	1,385	(No specimen)....
H. 4821	S. point, Charles Id., N. 70° E., 72 miles. (1° 47′ S., 91° 36′ W.)	.....do....	Jan. 11	12.28 a. m.	1,815	glob. Oz..........
H. 4822	S. point, Charles Id., N. 67° E., 132 miles. (2° 14′ S., 92° 30′ W.)	.....do....	Jan. 11	8.20 a. m.	1,871	glob. Oz..........
H. 4823	2° 42′ 30″ S., 93° 30′ W....	H. O. 823a; published July, 1882; ext. cor. Mar., 1896.	Jan. 11	4.21 p. m.	1,924	glob. Oz..........
H. 4824	3° 34′ S., 95° 35′ W........	.....do....	Jan. 12	8.33 a. m.	2,031	lt. glob, Oz.......

[a] Extensive collections were made at Wreck Bay, Chatham Island, and vicinity.

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
74	75	35.3	Luc. sdr.					
76	74	35.3	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
76	74	35.3	Wat. bot	800 fms.		None		
76	74	35.3	K. 1 ‖	800 fms. to surface.	25	None		Attached below thermometers.
78	74	35.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 14	NE None	.7	
85	75	35.3	Int. 2; K. 1	(?)	(?)	(?)	(?)	Towed for 20 minutes, intending to clear bottom from 50 to 100 fms., but when landed both nets were full of manganese nodules and mud. Hoisted to surface in 1 hour 33 minutes.
76	74		Surf. 4; e. 1	Surface.	20	NE	.6	
76	74		2 K. 1 ‡	Surface.	20	NE	.6	
77	73	35.3	Luc. sdr			None		
77	75	35.3	8 therm	Surface to 150 fms.		None		Temperatures at surface, 15, 30, 50, 75, 100, 125, and 150 fms.
77	75	35.3	Wat. bot	150 fms.		None		
77	75	35.3	K. 1 ‖	150 fms. to surface.	6	None		Attached below thermometers.
77	75	35.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 13	N. 25° E. None	.7	
76	75		Surf. 4; e. 1	Surface.	20	NE	.6	
76	75		2 K. 1 ‡	Surface.	20	NE	.6	
77	75		Luc. sdr			None		
78	75		9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
78	75		Wat. bot	800 fms.		None		
78	75		K. 1 ‖	800 fms. to surface.	22	None		Attached below thermometers.
78	76		Int. 1; 2 K. 2 §.	300 fms. to surface.	20 13	E. None	.7	
80	76		8′ Tnr.; m. b.; 2 wng.	Bottom.	46	E.	2.0	
76	75		Surf. 4; e. 1	Surface.	20	N. 20° E.	.6	
76	75		2 K. 1 ‡	Surface.	20	N. 20° E.	.6	
76	75		Int. 2 §	500 fms. to surface.	21 21	N. 20° E. None	.7	Towed approx. at 500 fms. depth; 600 fms. wire veered.
77	76	35.5	Luc. sdr			None		
76	74	35.5	Luc. sdr			None		
80	75		Luc. sdr			None		
80	77	35.4	Luc. sdr			None		
82	77	35.3	Luc. sdr.			None		

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Galapagos Islands to Manga Reva, Paumotu Group—Cont'd.		1904.		*fms.*	
D. 4717	5° 11′ S., 98° 56′ W	H. O. 823a; published July, 1882; ext. cor. Mar., 1896.	Jan. 13	8.22 a. m.	2,153	rd. C., glob. Oz
				9.39 a. m.	2,153	rd. C., glob. Oz
				9.39 a. m.	2,153	rd. C., glob. Oz
				9.39 a. m.	2,153	rd. C., glob. Oz
				10.19 a. m.	2,153	rd. C., glob. Oz
				12.21 p. m.	2,153	rd. C., glob. Oz
D. 4718	5° 32′ 30″ S., 99° 32′ W	do	Jan. 13	7.01 p. m.	2,200*	
				7.01 p. m.	2,200*	
D. 4719	6° 30′ S., 101° 17′ W	do	Jan. 14	8.25 a. m.	2,285	rd. C., mang. Nod.
				9.14 a. m.	2,285	rd. C., mang. Nod.
D. 4720	7° 13′ S., 102° 31′ 30″ W	do	Jan. 14	7.29 p. m.	2,200*	
				7.29 p. m.	2,200*	
D. 4721	8° 07′ 30″ S., 104° 10′ W	do	Jan. 15	8.22 a. m.	2,084	lt. br., glob. Oz
				9.23 a. m.	2,084	lt. br., glob. Oz
				9.23 a. m.	2,084	lt. br., glob. Oz
				9.23 a. m.	2,084	lt. br., glob. Oz
				10.05 a. m.	2,084	lt. br., glob. Oz
				11.55 a. m.	2,084	lt. br., glob. Oz
D. 4722	9° 31′ S., 106° 30′ W	do	Jan. 16	8.18 a. m.	1,923	(No specimen)
				9.01 a. m.	1,923	(No specimen)
D. 4723	10° 14′ S., 107° 45′ W	do	Jan. 16	7.30 p. m.	1,900*	
				7.30 p. m.	1,900*	
D. 4724	11° 13′ 30″ S., 109° 29′ W	do	Jan. 17	8.20 a. m.	1,841	(No specimen)
				9.16 a. m.	1,841	(No specimen)
				9.16 a. m.	1,841	(No specimen)
				9.16 a. m.	1,841	(No specimen)
				9.54 a. m.	1,841	(No specimen)
				11.48 a. m.	1,841	(No specimen)
D. 4725	11° 38′ S., 110° 05′ W	H. O. 824a; published Oct., 1882; ext. cor. July, 1896.	Jan. 17	7.30 p. m.	1,800*	
				7.30 p. m.	1,800*	
D. 4726	12° 30′ S., 111° 42′ W	do	Jan. 18	8.18 a. m.	1,700	br. M., glob. Oz
				10.00 a. m.	1,700	br. M., glob. Oz
D. 4727	13° 00′ S., 112° 45′ W	do	Jan. 18	7.26 p. m.	1,500*	
				7.26 p. m.	1,500*	
D. 4728	13° 47′ 30″ S., 114° 22′ W	do	Jan. 19	8.10 a. m.	1,055	R
				9.04 a. m.	1,055	R
				9.04 a. m.	1,055	R
				9.04 a. m.	1,055	R

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
81	75	35.2	Luc. sdr			None		
79	76	35.2	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
79	76	35.2	Wat. bot	800 fms		None		
79	76	35.2	K. 1 ‖	800 fms. to surface.	26	None		Attached below thermometers.
80	76	35.2	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 13	E None	.7	
83	76	35.2	8′ Agassiz; m. b.; 2 wng.	Bottom.	30	E	1.0	
76	76		Surf. 4; e. 1	Surface	21	SW	.6	
76	76		2 K. 1 ‡	Surface	21	SW	.6	
77	75	(?)	Luc. sdr			None		Thermometer registered 29.5°.
80	75		Int. 1; 2 K. 2 §.	300 fms. to surface.	20 14	E None	.7	
76	76		Surf. 4; e. 1	Surface	20	SW	.6	
76	76		2 K. 1 ‡	Surface	20	SW	.6	
79	75	(?)	Luc. sdr			None		Bottom thermometer registered 19.0°.
82	75		11 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 2 at 50, 100, 200, 300, 400, 600, and 2 at 800 fms.
82	75		Wat. bot	800 fms		None		
82	75		K. 1 ‖	800 fms. to surface.	24	None		Attached below thermometers.
84	75		Int. 1; 2 K. 2 §.	300 fms to surface.	15 13	E None	.5	
82	75		8′ Agassiz; m. b.; 2 wng.	Bottom.	21	E	.7	
87	75	35.1	Luc. sdr			None		
85	76	35.1	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 14	SW None	.7	
77	76		Surf. 4; e. 1	Surface	20	SW	.6	
77	76		2 K. 1 ‡	Surface	20	SW	.6	
88	77	35.1	Luc. sdr			None		
82	77	35.1	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
82	77	35.1	Wat. bot	800 fms		None		
82	77	35.1	K. 1 ‖	800 fms. to surface.	23	None		Attached below thermometers.
82	77	35.1	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 14	NW None	.7	
82	76	35.1	8′ Agassiz; m. b.; 2 wng.	Bottom.	40	NW	2.0	
77	77		Surf. 4; e. 1	Surface	20	SW	.6	
77	77		2 K. 1 ‡	Surface	20	SW	.6	
81	78	35.1	Luc. sdr			None		
80	77	35.1	8′ Agassiz; m. b.; 2 wng.	Bottom.	40	NW	2.0	No evidence when landed of gear having been on bottom.
79	77		Surf. 4; e. 1	Surface	20	SW	.6	
79	77		2 K. 1 ‡	Surface	20	SW	.6	
80	77	35.8	Luc. sdr			None		
82	78	35.8	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
82	78	35.8	Wat. bot	800 fms.		None		
82	78	35.8	K. 1 ‖	800 fms. to surface.	23	None		Attached below thermometers.

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Galapagos Islands to Manga Reva, Paumotu Group—Cont'd.		1904.		*fms.*	
D. 4728	13° 47′ 30″ S., 114° 22′ W...	H. O. 824a; published Oct., 1882; ext. cor. July, 1896.	Jan. 19	9.42 a. m..	1,055	R...............
				10.58 a. m.	1,055	glob. S., R........
D. 4729	14° 15′ S., 115° 13′ W	.....do....	Jan. 19	7.30 p. m..	1,200*	....
				7.30 p. m..	1,200*	....
D. 4730	15° 07′ S., 117° 01′ W	.....do....	Jan. 20	8.22 a. m..	1,912	(No specimen)....
				9.03 a. m..	1,912	(No specimen)....
D. 4731	15° 47′ S., 118° 22′ 30″ W..	.....do....	Jan. 20	7.30 p. m..	1,900*	....
				7.30 p. m..	1,900*	....
D. 4732	16° 32′ 30″ S., 119° 59′ W..	.....do....	Jan. 21	8.21 a. m..	2,012	glob. Oz..........
				9.23 a. m..	2,012	glob. Oz..........
				9.23 a. m..	2,012	glob. Oz..........
				9.23 a. m..	2,012	glob. Oz..........
				10.05 a. m.	2,012	glob. Oz..........
				12.09 p. m.	2,012	glob. Oz..........
D. 4733	16° 57′ 30″ S., 120° 48′ W...	.....do....	Jan. 21	7.28 p. m..	2,000*	....
				7.28 p. m..	2,000*	....
D. 4734	17° 36′ S., 122° 15′ W......	.....do....	Jan. 22	8.20 a. m..	2,019	(No specimen)....
				9.07 a. m..	2,019	(No specimen)....
D. 4735	18° 16′ S., 123° 34′ W	.....do....	Jan. 22	7.30 p. m..	2,100*	....
				7.30 p. m..	2,100*	....
D. 4736	19° 00′ S., 125° 05′ W......	.....do	Jan. 23	8.25 a. m..	2,289	dk. rd. br. M., mang. Nod., Glob.
				9.31 a. m..	2,289	dk. rd. br. M., mang. Nod., Glob.
				9.31 a. m..	2,289	dk. rd. br. M., mang. Nod., Glob.
				9.31 a. m..	2,289	dk. rd. br. M., mang. Nod., Glob.
				10.12 a. m.	2,289	dk. rd. br. M., mang. Nod., Glob.
				12.24 p. m.	2,289	dk. rd. br. M., mang. Nod., Glob.
D. 4737	19° 57′ 30″ S., 127° 20′ W ..	.....do....	Jan. 24	8.21 a. m..	2,060	rd. C., glob. Oz....
				9.11 a. m..	2,060	rd. C., glob. Oz....
				9.54 a. m..	2,060	rd. C., glob. Oz....
				10.29 a. m.	2,060	rd. C., glob. Oz....
D. 4738	20° 26′ 30″ S., 128° 30′ W...	.....do....	Jan. 24	7.27 p. m..	2,100*	....
				7.27 p. m..	2,100*	....
H. 4825	21° 03′ S., 130° 10′ W......	.....do....	Jan. 25	8.25 a. m..	2,197	rd. C., glob. Oz....
H. 4826	21° 36′ S., 131° 35′ W......	.....do....	Jan. 25	7.24 p. m..	2,123	rd. C...............
D. 4739	Mt. Duff, Manga Reva Id., S. 57° W., 105 miles. (22° 11′ S., 133° 21′ W.) .	H. O. 2024; published Nov., 1902.	Jan. 26	8.21 a. m..	2,042	dk. gy. glob. Oz...
				9.21 a. m..	2,042	dk. gy. glob. Oz...

Cruise of the Albatross, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
81	78	35.8	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 14	NE None	.7	
82	78	35.8	5½′ Alb.-Blk. spl.; m. b.; 2 wng.	Bottom.	45	NE	2.0	Bridle stops partly carried away, but net not capsized.
79	78	......	Surf. 4; e. 1.	Surface.	20	SW	.7	
79	78	......	2 K. 1 ‡	Surface.	20	SW	.7	
86	79	35.0	Luc. sdr.	......	......	None	......	
82	79	35.0	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 18	SW None	.7	
80	80	......	Surf. 4; e. 1.	Surface.	20	SW	.6	
80	80	......	2 K. 1 ‡	Surface.	20	SW	.6	
89	81	34.8	Luc. sdr.	......	......	None	......	
88	80	34.8	9 therm	Surface to 800 fms.	......	None	......	Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
88	80	34.8	Wat. bot.	800 fms.	......	None	......	
88	80	34.8	K. 1 ‖	800 fms. to surface.	25	None	......	Attached below thermometers.
88	80	34.8	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 15	NE None	.7	
86	81	34.8	8′ Agassiz; m. b.; 2 wng.	Bottom.	30	NE	1.0	
78	80	......	Surf. 4; e. 1.	Surface.	20	SW	.6	
78	80	......	2 K. 1 ‡	Surface.	20	SW	.6	
88	81	34.9	Luc. sdr.	......	......	None	......	
84	81	34.9	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 14	SW None	.7	
81	81	......	Surf. 4; e. 1.	Surface.	20	SW	.6	
81	81	......	2 K. 1 ‡	Surface.	20	SW	.6	
90	81	34.8	Luc. sdr.	......	......	None	......	"No calcareous or siliceous matter in bottom specimen; only flocculent stuff."—A. A.
84	81	34.8	9 therm	Surface to 800 fms.	......	None	......	Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
84	81	34.8	Wat. bot.	800 fms.	......	None	......	
84	81	34.8	K. 1 ‖	800 fms. to surface.	25	None	......	Attached below thermometers.
85	81	34.8	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 15	NE None	.7	
86	81	34.8	8′ Agassiz; m. b.; 2 wng.	Bottom.	30	NE	1.0	Bottom rough; net badly torn; no catch but manganese slabs.
90	81	34.8	Luc. sdr.	......	......	None	......	
88	81	34.8	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 15	SW None	.7	
89	81	34.8	Petersen int ‖.	100 fms. to surface.	4	None	......	
88	81	34.8	Petersen int ¶.	550 to 400 fms.	5	None	......	
82	81	......	Surf. 4; e. 1.	Surface.	20	SW	.6	
82	81	......	2 K. 1 ‡	Surface.	20	SW	.6	
81	80	34.5	Luc. sdr.	......	......	None	......	
79	80	34.8	Luc. sdr.	......	......	None	......	
81	79	34.9	Luc. sdr.	......	......	None	......	
81	79	34.9	9 Therm.	Surface to 800 fms.	......	None	......	Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.

DREDGING RECORDS OF THE EASTERN PACIFIC

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Galapagos Islands to Manga Reva, Paumotu Group—Cont'd.		1904.		*fms.*	
D. 4739	Mt. Duff, Manga Reva, Id., S. 57° W. 105 miles (22° 11′ S., 133° 21′ W.)	H. O. 2024, published Nov., 1902.	Jan. 26	9.21 a. m.	2,042	dk. gy. glob. Oz
				9.21 a. m.	2,042	dk. gy. glob. Oz
				10.01 a. m.	2,042	dk. gy. glob. Oz
				12.04 p. m.	2,042	dk. gy. glob. Oz
H. 4827	Mt. Duff, S. 34° W., 15 miles. (22° 55′ S., 134° 48′ 30″ W.)	do	Jan. 27	7.06 a. m.	2,070	lt. br. glob. Oz
	From Manga Reva, Paumotu Group, to Acapulco, Mexico. [a]					
H. 4828	Mt. Duff, N. 58° 30′ W., 7.6 miles. (23° 11′ 30″ S., 134° 50′ 30″ W.)	H. O. 2024; published Nov., 1902.	Feb. 5	9.55 a. m.	225	Co
H. 4829	Mt. Duff, S. 81° W., 7.3 miles. (23° 06′ 30″ S., 134° 49′ 30″ W.)	do	Feb. 5	10.46 a. m.	245	Corln., Pter., brk. sh.
H. 4830	Mt. Duff, S. 48° 30′ W., 5.7 miles. (23° 04′ S., 134° 53′ W.)	do	Feb. 5	11.36 a. m.	241	hrd. (no specimen).
H. 4831	Mt. Duff, S. 42° W., 7.7 miles. (23° 02′ 00″ S., 134° 52′ W.)	do	Feb. 5	12.28 p. m.	1,394	Co., S
H. 4832	21° 05′ 00″ S., 133° 01′ 00″ W.	H. O. 824a; published Oct., 1882; ext. cor. July, 1896.	Feb. 6	8.25 a. m.	2,225	rd. C
H. 4833	18° 30′ S., 130° 51′ W	do	Feb. 7	8.25 a. m.	2,319	rd. C
H. 4834	16° 20′ S., 128° 46′ W	do	Feb. 8	8.25 a. m.	2,194	rd. C., Glob
H. 4835	13° 51′ S., 126° 53′ W	do	Feb. 9	8.26 a. m.	2,185	dk. gy. Glob
H. 4836	11° 20′ S., 125° 01′ W	do	Feb. 10	8.22 a. m.	2,215	lt. gy. glob. Oz
D. 4740	9° 02′ S., 123° 20′ W	do	Feb. 11	8.29 a. m.	2,422	dk. gy. glob. and rad. Oz.
				9.36 a. m.	2,422	dk. gy. glob. and rad. Oz.
				9.36 a. m.	2,422	dk. gy. glob. and rad. Oz.
				9.36 a. m.	2,422	dk. gy. glob. and rad. Oz.
				10.23 a. m.	2,422	dk. gy. glob. and rad. Oz.
				12.45 p. m.	2,422	dk. gy. glob. and rad. Oz.
D. 4741	8° 29′ S., 122° 56′ W	do	Feb. 11	7.27 p. m.	2,400*	
				7.27 p. m.	2,400*	

[a] Extensive collections made along shores and reefs at Manga Reva.

CRUISE OF THE ALBATROSS, 1904-5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
81	79	34.9	Wat. bot	800 fms		None		
81	79	34.9	K. 1 ‖	800 fms. to surface.	24	None		Attached below thermometers.
78	79	34.9	Int. 1; 2 K. 2 §	300 fms. to surface.	20 14	N. 20° W. None	.7	
83	80	34.9	5½′ Alb.-Blk. spl.; m. b.	Bottom.	20	N. 20° W.	.7	Trawl net capsized; no catch except rock and manganese.
78	78	34.6	Luc. sdr			None		
77	77	53.5	Luc. sdr			None		Position about ¼ mile off outer reef. Chart used incorrectly drawn. R. A. r. t. Aka Maru Id. to r. t. Au Kena Id. 33° 08′. L. A. r. t. Kamaka Id. to r. t. Aka Maru Id. 41° 55′.
78	77	50.4	Luc. sdr			None		Position about ½ mile off outer reef. R. A. r. peak Manga Reva Id. to l. peak (west) Au Kena Id. 32° 20′, L. A. l. peak Au Kena Id. to l. t. Kamaka Id. 30° 29′.
78	77	51.5	Luc. sdr			None		Position about ¼ mile off outer reef. R. A. r. to l. t. Manga Reva Id. 30° 57′ 30″. L. A. l. t. Manga Reva Id. to peak Kamaka Id. 24° 54′.
78	77	35.0	Luc. sdr			None		Position about 1 mile off outer reef. R. A. r. to l. t. Manga Reva Id. 15° 46′. L. A. l. t. Manga Reva Id. to l. or Eastern peak on Au Kena Id. 23° 10′ 40″.
82	79	35.0	Luc. sdr			None		
78	81	34.5	Luc. sdr			None		
87	82	34.5	Luc. sdr			None		
82	82	34.6	Luc. sdr			None		
82	80	34.5	Luc. sdr			None		
80	81	34.2	Luc. sdr			None		
80	81	34.2	9 Therm	Surface to 800 fms.		None		Temperatures taken at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
80	81	34.2	Wat. bot	800 fms.		None		
80	81	34.2	K. 1 ‖	800 fms. to surface.	25	None		Attached below thermometers.
83	81	34.2	Int. 1; 2 K. 2 §.	300 fms. to surface.	20 14	N. 20° E. None	.7	
85	81	34.2	8′ Agassiz; m. b.	Bottom.	30	N. 20° E.	1.0	
84	80		Surf. 4; e. 1	Surface	20	N. 20° E.	.6	
84	80		2 K. 1 ‡	Surface	20	N. 20° E.	.6	

Station No.	Position.	Chart.	Date.	Time of day.	Depth.	Character of bottom.
	From Manga Reva, Paumotu Group, to Acapulco, Mexico—Cont'd.		5 1904.		*fms.*	
H. 4837	7° 10′ S., 122° 13′ W	H. O. 824a; published Oct., 1882; ext. cor. July, 1896.	Feb. 12	8.28 a. m.	2,380	(No specimen)
H. 4838	4° 50′ S., 120° 45′ W	do	Feb. 13	8.24 a. m.	2,350	lt. gy. glob. Oz
H. 4839	2° 14′ S., 118° 55′ W	do	Feb. 14	8.25 a. m.	2,291	lt. gy. glob. Oz
D. 4742	0° 04′ 00″ S., 117° 07′ 00″ W	do	Feb. 15	8.27 a. m.	2,320	fne. lt. gy. glob. Oz.
				10.15 a. m.	2,320	fne. lt. gy. glob. Oz.
				12.39 p. m.	2,320	fne. lt. gy. glob. Oz.
				4.01 p. m.	2,320	fne. lt. gy. glob. Oz.
				4.01 p. m.	2,320	fne. lt. gy. glob. Oz.
				4.01 p. m.	2,320	fne. lt. gy. glob. Oz.
D. 4743	0° 21′ N., 117° 02′ 30″ W	do	Feb. 15	7.25 p. m.	2,300*	
				7.25 p. m.	2,300*	
H. 4840	1° 35′ N., 116° 38′ W	H. O. 527; published Jan., 1874; ext. cor., Apr., 1897.	Feb. 16	8.21 a. m.	2,189	(No specimen)
H. 4841	3° 25′ 30″ N., 115° 05′ W	do	Feb. 17	8.26 a. m.	2,200	dk. gy. glob. Oz
H. 4842	4° 55′ N., 112° 27′ W	do	Feb. 18	8.24 a. m.	2,174	dk. gy. glob. Oz
H. 4843	7° 09′ N., 110° 45′ W	do	Feb. 19	8.25 a. m.	2,225	(No specimen)
H. 4844	8° 52′ N., 108° 54′ W	do	Feb. 20	8.24 a. m.	2,058	rd. C
H. 4845	10° 38′ N., 106° 47′ 30″ W	do	Feb. 21	8.21 a. m.	1,955	stky. br. M
H. 4846	12° 42′ 30″ N., 104° 45′ W	do	Feb. 22	8.18 a. m.	1,753	stky. br. M
H. 4847	14° 50′ N., 101° 31′ W	do	Feb. 23	8.22 a. m.	2,050	stky. br. M
H. 4848	Acapulco Lt. Ho., N. 5° E., 29′ (16° 20′ N., 99° 58′ 30″ W.).	H. O. 933; published Nov., 1884.	Feb. 24	4.28 a. m.	2,474	(No specimen)

CRUISE OF THE ALBATROSS, 1904–5—Continued.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	Direction.	Distance.	
°F.	°F.	°F.			h. m.		mi.	
82	80	34.3	Luc. sdr			None		
82	79	34.3	Luc. sdr			None		
81	79	34.3	Luc. sdr			None		
78	77	34.3	Luc. sdr			None		
74	77	34.3	Int. 1; 2 K. 2 §	300 fms. to surface.	20 16	NE None	.7	Ring of large int. net badly bent; fine netting torn from binding. Lining of one Kofoid net also carried away.
81	77	34.3	8′ Agassiz; m. b.; 2 wng.	Bottom.	45	NE	1.5	
81	78	34.3	9 therm	Surface to 800 fms.		None		Temperatures at surface, 25, 50, 100, 200, 300, 400, 600, and 800 fms.
81	78	34.3	Wat. bot.	800 fms		None		
81	78	34.3	K. 1 ‖	800 fms. to surface.	23	None		Attached below thermometers.
80	78		Surf. 4; e. 1	Surface	20	N. 35° E.	.6	
80	78		2 K. 1 ‡	do	20	N. 35° E.	.6	
80	78	34.4	Luc. sdr			None		
82	79	34.4	Luc. sdr			None		
83	80	34.4	Luc. sdr			None		
82	80	34.5	Luc. sdr			None		
83	80	34.7	Luc. sdr			None		
82	79	34.4	Luc. sdr			None		
83	79	34.9	Luc. sdr			None		
80	80	35.2	Luc. sdr			None		
77	82	35.2	Luc. sdr			None		

SERIAL TEMPERATURE OBSERVATIONS DURING THE EASTERN PACIFIC CRUISE OF THE ALBATROSS, 1904–5. [a]

Between Galapagos Islands and Callao, Peru, via Sechura Bay, Peru

Station No.	Date.	Positions of thermometers.																		
		Surface.	5 fms.	10 fms.	15 fms.	20 fms.	25 fms.	30 fms.	40 fms.	50 fms.	75 fms.	100 fms.	125 fms.	150 fms.	175 fms.	200 fms.	300 fms.	400 fms.	600 fms.	800 fms.
	1904.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
D. 4647	Nov. 9	71.5								58.8		56.7				50.4	45.3	42.8	39.2	37.9
D. 4649	Nov. 10	71.0					62.9			57.8		55.6				50.3	45.1	42.8	39.8	39.0
D. 4651	Nov. 11	67.0					60.1			58.8		57.5				51.3	48.2	44.4	40.6	39.5
			b (?)	61.5		60.6		59.9	b (?)	58.7	57.9	57.1								
D. 4662	Nov. 16	69.4					69.1			59.3		53.5				49.7	46.2	42.5	39.4	37.4
D. 4666	Nov. 18	69.0					67.0			58.5		55.3				50.6	45.3	43.2	39.3	37.3
D. 4670	Nov. 20	67.0					63.8			59.7		54.1				48.9	44.6	42.0	39.4	38.1

Between Callao, Peru, and Easter Island.

Station No.	Date.	Surface.	5 fms.	10 fms.	15 fms.	20 fms.	25 fms.	30 fms.	40 fms.	50 fms.	75 fms.	100 fms.	125 fms.	150 fms.	175 fms.	200 fms.	300 fms.	400 fms.	600 fms.	800 fms.
	1904.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
D. 4676	Dec. 5	69.5					65.7			64.4		53.4				49.4	44.8	42.2	39.1	37.3
D. 4681	Dec. 8	70.0					68.5			67.8		61.3				49.1	44.1	41.8	39.1	37.3
D. 4683	Dec. 9	70.3					69.0			68.5	68.4	62.7	62.5	52.7	50.4	50.6				
D. 4685	Dec. 10	71.7					68.6			67.7		64.8				49.2	42.7	41.1	38.7	37.2
D. 4689	Dec. 12	73.7					70.1			68.8		64.4				51.0	44.1	41.4	38.3	37.0

Between Easter Island and Galapagos Islands

Station No.	Date.	Surface.	5 fms.	10 fms.	15 fms.	20 fms.	25 fms.	30 fms.	40 fms.	50 fms.	75 fms.	100 fms.	125 fms.	150 fms.	175 fms.	200 fms.	300 fms.	400 fms.	600 fms.	800 fms.
	1904.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
H. 4818	Dec. 22	74.6					73.6			68.8		67.0				56.2	53.2	41.6	38.6	36.8
D. 4701	Dec. 26	74.7					72.6			70.9		68.5				50.4	43.5	41.3	39.0	37.2
D. 4707	Dec. 29	72.7					72.5			69.8		56.7				49.2	45.1	42.2	39.1	37.3
D. 4711	Dec. 31	75.3					73.8			58.9		54.9				51.1	45.6	43.4	39.2	37.4
	1905.																			
D. 4713	Jan. 1	75.2			75.2			74.1		62.5	56.3	54.9	54.4	53.8						
D. 4715	Jan. 2	74.7					70.1			62.7		56.7				51.6	47.9	43.8	40.4	38.2

Between Galapagos Islands and Manga Reva, Paumotu Group.

	1905.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
D. 4717	Jan. 13	76.2	....	....	....	....	76.0	....	....	66.7	....	65.3	....	....	....	52.9	46.7	44.1	39.4	37.9
D. 4721	Jan. 15	75.7	....	....	....	....	75.7	....	....	71.7	....	55.7	....	....	....	50.3	46.3	42.7	39.2	37.3
D. 4724	Jan. 17	76.7	....	....	....	....	76.6	....	....	73.8	....	64.5	....	....	....	48.5	45.3	42.4	39.0	37.3
D. 4728	Jan. 19	78.7	....	....	....	....	78.7	....	....	74.2	....	67.6	....	....	....	50.1	44.4	42.4	39.1	37.4
D. 4732	Jan. 21	80.8	....	....	....	....	77.3	....	....	73.6	....	70.5	....	....	....	51.9	44.4	42.3	39.3	37.4
D. 4736	Jan. 23	81.0	....	....	....	....	79.6	....	....	74.7	....	71.7	....	....	....	55.4	44.1	41.2	38.9	37.3
D. 4739	Jan. 26	79.7	....	....	....	....	79.5	....	....	74.7	....	68.5	....	....	....	56.7	44.6	41.7	39.3	37.4

Between Manga Reva, Paumotu Group and Acapulco, Mexico.

	1905.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
D. 4740	Feb. 11	80.7	....	....	....	....	80.6	....	....	78.7	....	66.5	....	....	....	48.8	45.0	41.9	39.1	37.4
D. 4742	Feb. 15	77.4	....	....	....	....	75.8	....	....	70.1	....	56.2	....	....	....	51.5	45.5	42.5	39.4	37.8

[a] The readings are from compared Negretti and Zambra thermometers and are corrected for temperature. The instruments were in Tanner cushioned cases and the latter attached at recorded intervals to the dredge cable in lowering.

[b] Thermometer failed to trip at 5 and 40 fathoms.

3. INVESTIGATIONS DURING ALASKA CRUISE.

Incident to the employment of the *Albatross* to assist in establishing the salmon hatchery at Yes Bay, Alaska, a number of hauls of plankton nets were made on the voyage from Seattle. These hauls,

DREDGING RECORDS OF

Station No.	Position.	Chart.	Date.	Time of day.	Bottom depth.	Character of bottom.
	Seattle, Wash., to Yes Bay, Alaska.				*Fms.*	
			1905.			
D. 4744	Egg Id. light, S. 8° 40′ E., 6.7 miles. (51° 21′ 25″ N., 127° 51′ 58″ W.)	H. O. 1767 (1899)	June 26	1.33 p. m. 1.48 p. m.	56 56	fne S....... fne S.......
D. 4745	Seabreeze Point, Kennedy Id. S. 72° 35′ E., 1.1 miles. (53° 59′ 45″ N., 130° 11′ 37″ W.)	H. O. 1764 (1899).	June 28	6.15 a. m. 6.21 a. m.	31 31	gy. S....... gy. S.......
D. 4746	Mary Id. light, N. 39° 15′ W., 4 miles. (55° 02′ 45″ N., 131° 6′ 39″ W.)	C. & G. S. 8075(1904)	June 28	2.37 p. m.	197–185*	gn. M*......
D. 4747	Bushy Point, S. 53° 45′ E., 1 mile. (55° 44′ 23″ N., 131° 45′ 13″ W.)	C. S. 8105 (1903)	June 30	1.58 p. m.	300–320*	Mud*.......
	Yes Bay to Anan River and return.					
D. 4748	Bushy Point, S. 60° 45′ E., 1 mile. (55° 44′ 18″ N., 131° 45′ 28″ W.)	C. S. 8105 (1903)	Aug. 29	10.29 a. m. 11.18 a. m.	300–185 300–185	M. and Sh.. ....
D. 4749	Guard Id. light, S. 4½° W., 6.3 miles. (55° 33′ N., 131° 51′ 48″ W.)	C. S. 8100 (1899)	Aug. 29	12.59 p. m. 1.43 p. m.	233–220*	S. and M?* . ...
D. 4750	Tolstoi Point, N. 48½° W., 7.5 miles. (55° 35′ 15″ N., 132° 33′ W.)	.....do.....	Aug. 29	4.18 p. m. 4.58 p. m.	290–340*	M*.......... ....
D. 4751	Lemesurier Point, S. 32° W., 12.9 miles. (55° 56′ 50″ N., 132° 04′ 20″ W.)	.....do.....	Aug. 30	11.14 a. m. 11.53 a. m.	369–288* 288	G*.......... ....
D. 4752	Point Warde, S., ½ mile....... (56° 11′ N., 151° 57′ 30″ W.)	C. S. 8200 1904.	Aug. 30	2.21 p. m. 2.55 p. m.	210–190*	M*.......... ....
	Yes Bay to Seattle.					
D. 4753	Bushy Point, N. 39¼° E., 3 miles. (55° 41′ 30″ N., 131° 46′ 12″ W.)	C. S. 8105 (1903)	Oct. 1	11.25 a. m.	266–280–150*	M*..........
D. 4754	Mary Id. light, N. 25½° W., 3½ miles. (55° 03′ N., 131° 08′ 48″ W.)	C. S. 8075 (1904)	Oct. 4	9.11 a. m.	150*	rky?*.......
D. 4755	Old N. Sand Headlight, S. 67° E., 3.4 miles. (49° 06′ 30″ N., 123° 21′ 30″ W.)	C. S. 6300 (1898)	Nov. 5	10.06 a. m. 10.37 a. m.	120*	M*.......... ....
D. 4756	West Point light, N. 4¾° E., 2 miles. (47° 37′ 48″ N., 122° 26′ 20″ W.)	C. S. 6450 (1905)	Nov. 16	10.38 a. m. 11.10 a. m.	115*	M*.......... ....

13 in number, were distributed from Puget Sound to Bradfield Canal, near Wrangell Island, Alaska. Serial temperatures and water densities also were taken for these stations. The cruise extended from June to the middle of November, 1905.

ALASKA CRUISE, 1905.

Temperature.			Apparatus.	Trial.		Drift.		Remarks.
Air.	Surface.	Bottom.		Depth.	Duration.	True direction.	Distance.	
° F.	° F.	° F.			h. m.		Miles.	
64	59	......	Tnr. sdr	....	0 20	N. 8° W	......	50 fms. cable out. Near mouth of Fitzhugh Sound off Rivers Inlet. Surface temperature increased from 52° at noon to 60° at 3 p. m. Nearest land about 2½ miles distant.
64	59	......	Int. 3; 2 K 2 §.	40 fms. to surface.	2			
53	52	......	Tnr. sdr	....	18	N. 23° W	......	20 fms. cable out. In region of mouth of Skeena River. Nearest land ¼ to ½ mile distant.
53	52	......	Int. 3; 2 K 2 §.	15 fms. to surface.	1			
60	56	......	Int. 3; 2 K 2 §.	125 fms. to surface.	20 8	N. 28° W	......	150 fms. cable out. Deep water off Boca de Quadra. Nearest land 3 miles distant. Bottom from chart.
61	59	......	Int. 2; K 2	275 fms. to surface.	20 14	N. 6° E	......	300 fms. cable out. Nearest land 1 mile distant.
53	56	......	Int. 3; K 3, K 2 §	200 fms. to surface.	20 13	S. 57° W	1¼	300 fms. cable out. Ran into bottom and filled net with mud. Wrecked the K 2. Thermometer and water bottle at 5, 10, 25, 50, and 100 fms.; first two thermometers failed to trip.
54	57	......	5 therm., 5 wat. bot.	Surface to 100 fms.	5	....	......	
57	58	......	Int. 3; K 3, K 2 §	130 fms. to surface.	20 9	S. 40° W	......	200 fms. cable out. Nearest land 1½ miles distant. Thermometer and water bottle at 5, 10, 25, 50, 100, 125 fms. Lowered 3 fms. before heaving in. First thermometer failed to trip.
59	58	......	6 therm., 6 wat. bot.	Surface to 125 fms.	5	....	......	
59	57	......	Int. 3; K 3, K 2 §	175 fms. to surface.	20 11	N	......	250 fms. cable out. Nearest land 1 mile. Thermometer and water bottle at 5, 10, 25, 50, 100, 175, fms. Lowered 5 fms. before heaving in.[a]
67	56	......	6 therm., 6 wat. bot.	Surface to 175 fms.	5	....	......	
63	58	......	Int. 3; 2 K 2 §.	175 fms. to surface.	20 10	N	1	250 fms. cable out. Nearest land ½ mile. Thermometer and water bottle at 10, 15, 30, 55, 105, 180 fms. Placed as before but in lowering 5 fms. before heaving in wire fouled; 5 fms. added for correction.
58	58	......	6 therm., 6 wat. bot.	Surface to 175 fms.	7	....	......	
69	56	......	Int. 3; 2 K 2 §.	125 fms. to surface.	20 6	N. 80° E	......	150 fms. cable out. Thermometer and water bottle at 5, 10, 25, 50, 100, 125 fms. Fouled and lowered in heaving in.
63	56	......	6 therm., 6 wat. bot.	Surface to 125 fms.	5	....	......	
45	50	......	Int. 3; 2 K 2 §.	150 fms. to surface.	20 12	S. 48° W	1⅜	200 fms. cable out. Land ½ mile distant at end of haul.
50	50	......	Int. 3; 2 K 2 §.	75 fms. to surface.	20 4	S. 35° E	......	100 fms. cable out. Land 1¾ miles distant.
46	49	......	Int. 3; 2 K 2 §.	75 fms. to surface.	20 5	S. 18° W	......	100 fms. cable. Off mouth of Fraser River, about 2½ miles from shoals. Thermometer and water bottle at 5, 10, 25, 50, 75 fms.
47	48	......	5 therm., and 5 wat. bot.	Surface to 75 fms.	5	....	......	
52	52	......	Int. 3; 2 K 2 §.	75 fms.	19 5	N. 15° W	......	100 fms. cable. Nearest land 1¼ miles. Thermometer and water bottle at 5, 10, 25, 50, and 75 fms.
......	......	......	5 therm., 5 wat. bot.	Surface to 75 fms.	5	....	......	

[a] Lowering 5 fathoms at time of heaving in, while not affecting the thermometers, makes it necessary for entire accuracy to add 5 fathoms to the depth stated for the water specimens

SERIAL TEMPERATURES AND WATER DENSITIES RECORDED DURING ALASKA CRUISE, 1905.

Station No.	Date.	Position of thermometers. Surface.	5 fms.	10 fms.	25 fms.	50 fms.	75 fms.	100 fms.	125 fms.	175 fms.	Remarks.
	1905.	°	°	°	°	°	°	°	°	°	
D. 4748	Aug. 29	56	55.2	54.8	50.7	47.6	......	43.6	......	......	First two did not trip.
D. 4749	Aug. 29	58	......	56.8	57.8	51.2	......	42.6	42.2	......	First one did not trip.
D. 4750	Aug. 29	57	53.7	52.3	54.8	43.5	......	42.1	......	41.5	See these stations in dredging record and footnote on p. 79.
D. 4751	Aug. 30	58	53.8	49.9	45.6	46.0	......	42.9	......	42.6	
D. 4752	Aug. 30	56	50.7	47.4	44.9	43.1	......	42.7	42.8	......	
D. 4755	Nov. 5	48	49.8	49.7	49.6	49.1	49.0	......	......	......	
D. 4756	Nov. 16	52	51.4	51.2	51.1	50.6	50.2	......	......	......	

Station No.	Date.	Position of water bottles. Surface.	5 fms.	10 fms.	25 fms.	50 fms.	75 fms.	100 fms.	125 fms.	175 fms.	Remarks.
	1905.	°	°	°	°	°	°	°	°	°	
D. 4748	Aug. 29	......	19.8	21.6	22.1	22.2	......	24.4	......	......	
D. 4749	Aug. 29	12.3	15.2	19.9	23.1	22.6	......	22.6	24.0	......	Apparent irregularity.
D. 4750	Aug. 29	21.0	20.1	20.4	21.0	23.6	......	24.3	......	24.7	See this station in dredging record and footnote on p. 79.
D. 4751	Aug. 30	13.5	20.6	20.8	22.3	24.5	......	24.2	......	24.1	
D. 4752	Aug. 30	9.0	19.8	20.6	21.2	21.7	......	23.7	24.3	......	
D. 4755	Nov. 5	15.5	18.3	18.6	20.2	21.5	21.7	......	......	......	
D. 4756	Nov. 16	21.5	21.07	21.2	21.5	21.5	21.7	......	......	......	

STATISTICS OF THE FISHERIES OF THE MIDDLE ATLANTIC STATES FOR 1904.

Bureau of Fisheries Document No. 609.

CONTENTS.

STATISTICS OF THE FISHERIES OF THE MIDDLE ATLANTIC STATES FOR 1904.

INTRODUCTION.

This report is based upon a canvass made by the regular statistical agents of the Bureau in 1905, and in general presents data for the calendar year 1904. The statistics of the oyster industry, however, in all sections except New York, Delaware, Worcester County, Md., and Accomac and Northampton counties, Va., represent the oyster season of 1904–5. It should be noted that the statistics for New York and Pennsylvania do not include the fisheries of the Great Lakes and the interior waters of those states. The present statistics for the Middle Atlantic States have already been published in condensed form in Statistical Bulletin No. 184, issued August 6, 1906.

Earlier publications of the Bureau dealing with the fisheries of this region are as follows:

The Fisheries and Fishery Industries of the United States, by G. Brown Goode and associates. Section II, Geographical Review of the Fisheries for 1880, pt. vi to xi, p. 341–473, 1887. Also Section V, History and Methods of the Fisheries, 1887.

The Sturgeon and Sturgeon Industries of the Eastern Coast of the United States, by John A. Ryder. Bulletin U. S. Fish Commission, vol. viii, 1888 (1890), p. 231–328.

The Oyster Industry of Maryland, by Charles H. Stevenson. Bulletin U. S. Fish Commission, vol. xii, 1892 (1894), p. 203–297.

Notes on the Oyster Industry of New Jersey, by Ansley Hall. Report U. S. Fish Commission, 1892 (1894), p. 463–528.

A Statistical Report on the Fisheries of the Middle Atlantic States, by Hugh M. Smith. Bulletin U. S. Fish Commission, vol. xiv, 1894 (1895), p. 339–467.

The Shad Fisheries of the Atlantic Coast of the United States, by Charles H. Stevenson. Report U. S. Fish Commission, 1898 (1899), p. 101–269.

Notes on the Extent and Condition of the Alewife Fisheries of the United States in 1896, by Hugh M. Smith. Report U. S. Fish Commission, 1898 (1899), p. 31–43.

The Sturgeon Fishery of Delaware River and Bay, by John N. Cobb. Report U. S. Fish Commission, 1899 (1900), p. 369–380.

Statistics of the Fisheries of the Middle Atlantic States. Report U. S. Fish Commission, 1900 (1901), p. 195–310.

Statistics of the Fisheries of the Middle Atlantic States. Report U. S. Fish Commission, 1902 (1904), p. 433–540.

GENERAL AND COMPARATIVE STATISTICS.

Persons employed.—The number of persons employed in the fisheries of the Middle Atlantic States in 1904 was 83,103, of whom 62,361 were fishermen in the vessel and shore fisheries, and 20,742 were shoresmen in the wholesale fishery trade and shore industries related to the fisheries. Maryland employed in its fisheries 30,337 persons; Virginia, 28,868; New York, 11,493; New Jersey, 9,094; Delaware, 1,899, and Pennsylvania, 1,412. In comparison with their returns for 1901, the year for which the last previous canvass was made, all the states of this region show a decrease in the number of persons employed in the fisheries. The largest decreases were in Maryland, 5,923; in New Jersey, 2,936, and in Pennsylvania, 1,072. The aggregate decrease was 10,558.

Investment.—The total amount of capital invested was $26,673,521. In New York the investment was $10,621,616; in Maryland, $5,983,-465; in Virginia, $4,614,934; in New Jersey, $2,685,796; in Pennsylvania, $2,097,715, and in Delaware, $669,995. Compared with 1901, the investment has increased $1,593,150, or 6.35 per cent. There has been an increase of $1,177,345 in New York, $12,798 in Delaware, and $981,830 in Virginia, but a decrease in each of the other three states. The investment included 3,583 fishing and transporting vessels, valued at $4,285,243 and having a net tonnage of 54,540 tons and outfits valued at $1,146,958; 32,760 boats in the shore fisheries, valued at $1,876,356; fishing apparatus used by vessels and boats to the value of $1,656,954; shore and accessory property valued at $9,373,710; and cash capital amounting to $8,334,300. The forms of fishing apparatus having the largest aggregate value were pound nets, trap nets, and weirs, $749,207; dredges, tongs, rakes, etc., $302,007; gill nets, $237,613; seines, $204,236; fyke nets, $84,864, and lines, $23,594.

Products.—The products of the fisheries amounted to 811,857,062 pounds, having a value to the fishermen of $18,963,976. Of this output New York produced 277,649,747 pounds, valued at $6,230,558; New Jersey, 90,108,068 pounds, valued at $3,385,415; Pennsylvania, 2,046,294 pounds, valued at $167,499; Delaware, 5,608,289 pounds, valued at $259,590; Maryland, 81,128,866 pounds, valued at $3,336,-560, and Virginia, 355,315,798 pounds, valued at $5,584,354. The most important product of the fisheries of these states is the oyster, the yield of which was 17,866,673 bushels, valued at $11,547,629. Next in value was the menhaden, the catch being 511,777,571 pounds, valued at $1,338,621. Menhaden represented 63 per cent of the total quantity, and oysters 60 per cent of the total value of the products. The yield of hard and soft clams aggregated 822,575

bushels, valued at $1,018,653. Among the other important species were alewives, 31,717,124 pounds, $262,596; bluefish, 14,795,651 pounds, $707,844; butterfish, 3,646,683 pounds, $113,835; cod, 2,433,450 pounds, $106,547; eels, including fresh, salted, and smoked, 1,858,266 pounds, $114,941; flounders, 3,160,316 pounds, $113,688; sea bass, 2,953,362 pounds, $122,103; shad, 16,954,738 pounds, $995,140; squeteague, 25,548,484 pounds, $669,482; striped bass, 1,338,081 pounds, $136,143; crabs, hard and soft, 31,975,446 pounds, $674,633; and scallops, 148,799 bushels, $145,646. Various other species were taken in noteworthy quantities.

The products in 1904 compared with 1901 have decreased in quantity 7,189,514 pounds, but have increased in value $1,478,476. The yield has increased in both quantity and value in New York, and in value in Delaware and Virginia, but has decreased in both respects in all the other states. The increase in New York was chiefly in the catch of menhaden, squeteague, and oysters. The yield of shad decreased in all the states of this region except Virginia, where there was considerable increase in both the quantity and value. There was also an increase in the value of the catch in Delaware and Maryland. The decrease in the shad catch amounted in all to 14,942,949 pounds, or nearly 47 per cent in quantity, and $258,482, or over 20 per cent in value. The yield of oysters also has decreased, 1,883,004 bushels in quantity, but has increased $1,260,073 in value. The decrease was chiefly in New Jersey and Maryland; there was a slight decrease in the quantity taken in Virginia, but an increase in the value.

The following tables give the number of persons employed, the amount of capital invested, and the quantity and value of the products of the fisheries of the Middle Atlantic States in 1904, and also a comparison of the extent of the fisheries in 1901 and 1904.

Number of Persons Engaged in the Fisheries of the Middle Atlantic States in 1904.

States.	Fishermen.	Shoresmen.	Total.
New York	8,496	2,997	11,493
New Jersey	8,293	801	9,094
Pennsylvania	820	592	1,412
Delaware	1,495	404	1,899
Maryland	20,054	10,283	30,337
Virginia	23,203	5,665	28,868
Total	62,361	20,742	83,103

INVESTMENT IN THE FISHERIES OF THE MIDDLE ATLANTIC STATES IN 1904.

Items.	New York.		New Jersey.		Pennsylvania.		Delaware.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	482	$1,314,275	366	$495,025	16	$48,200	28	$18,050
Tonnage	9,880		4,361		286		225	
Outfit		455,120		125,461		6,785		3,226
Vessels transporting	204	290,375	68	65,550			7	6,500
Tonnage	3,720		775				107	
Outfit		30,395		7,405				735
Boats	4,894	320,844	5,172	441,989	243	10,685	960	40,558
Seines	295	57,977	282	30,828	73	5,814	179	8,110
Gill nets	1,093	42,180	2,612	92,396	90	4,132	680	20,199
Pound nets, trap nets, and weirs	306	105,965	225	192,617			42	1,580
Fyke nets	8,946	41,460	1,962	16,231	159	383	998	1,304
Stop nets			56	5,992	1	100		
Bag nets			76	1,250				
Lines		7,372		5,305		7		42
Fish baskets					57	1,195		
Eel pots	8,091	7,964	3,279	4,495			1,795	826
Lobster pots	6,405	9,715	1,311	1,493			50	60
Dredges, tongs, rakes, and hoes	6,947	33,033	5,188	60,896	32	3,017	337	3,044
Other apparatus		326		1,193		482		221
Shore and accessory property		4,314,115		905,620		846,915		342,540
Cash capital		3,590,500		232,050		1,170,000		223,000
Total investment		10,621,616		2,685,796		2,097,715		669,995

Items.	Maryland.		Virginia.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	777	$423,130	750	$843,988	2,419	$3,142,668
Tonnage	7,528		9,149		31,429	
Outfit		115,468		278,187		984,247
Vessels transporting	438	453,500	447	326,650	1,164	1,142,575
Tonnage	11,463		7,046		23,111	
Outfit		71,161		53,015		162,711
Boats	9,276	470,851	12,215	591,429	32,760	1,876,356
Seines	234	23,431	320	78,076	1,383	204,236
Gill nets	3,835	45,749	8,144	32,957	16,454	237,613
Trammel nets	15	1,410			15	1,410
Pound nets, trap nets, and weirs	963	98,320	1,656	350,725	3,192	749,207
Fyke nets	5,004	15,314	584	10,172	17,653	84,864
Stop nets					57	6,092
Bag nets					76	1,250
Lines		6,257		4,611		23,594
Fish baskets					57	1,195
Eel pots	4,527	2,441	1,255	1,280	18,947	17,006
Lobster pots					7,766	11,268
Dredges, tongs, rakes, and hoes	15,275	133,064	14,844	68,953	42,623	302,007
Crab dredges and scrapes	2,655	8,600	1,140	3,191	3,795	11,791
Other apparatus		1,614		1,585		5,421
Shore and accessory property		1,798,505		1,166,015		9,373,710
Cash capital		2,314,650		804,100		8,334,300
Total investment		5,983,465		4,614,934		26,673,521

Quantity and Value of Products Taken in the Fisheries of the Middle Atlantic States in 1904.

Species.	New York.		New Jersey.		Pennsylvania.		Delaware.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore			30,970	$450				
Alewives, fresh	1,021,183	$16,181	896,445	8,165	97,800	$615	344,860	$4,495
Alewives, salted			96,000	1,500	172,000	2,925		
Black bass							420	50
Bluefish	11,413,786	556,527	2,723,390	120,085			250	15
Bonito	310,025	12,508	597,501	24,499				
Butterfish	579,150	27,698	1,357,080	39,631				
Catfish	137,316	6,995	112,440	8,418	17,200	1,147	108,170	5,815
Cero			5,431	262				
Cod	1,170,485	52,710	1,261,855	53,789			800	36
Crevallé			1,420	30				
Croaker			342,341	7,066			25,150	506
Drum			226,110	1,452			3,500	70
Eels, fresh	708,937	53,832	407,284	25,920	60,650	4,146	268,255	14,037
Eels, smoked			325	80				
Flounders	1,820,332	67,159	1,052,239	37,563			4,100	187
German carp	253,205	15,913	468,300	35,373	10,350	549	216,560	14,099
Haddock	307,685	11,633	140,600	6,318				
Hake	68,110	1,527	389,850	10,550				
Hickory shad			14,270	310				
Horse mackerel			12,805	187				
Kingfish	22,380	2,480	20,826	2,587				
Mackerel	212,595	13,219	113,743	7,445				
Menhaden	216,399,600	693,929	37,609,805	109,090				
Mullet, fresh			54,000	2,050			4,000	135
Mullet, salted			3,000	45				
Mummichog	124,000	620						
Perch, white	39,375	2,945	253,350	19,620			186,050	10,689
Perch, yellow	25,273	1,695	600	35				
Pike and pickerel	2,015	190	600	55			11,050	544
Pollock	73,500	1,503	10,234	246				
Round herring			132,250	2,061				
Salmon, Atlantic			36	18				
Scup	1,493,828	48,068	1,054,682	32,067				
Sea bass	320,116	21,546	2,572,046	97,903			600	30
Sea robins	261,030	297	37,200	348				
Shad	498,119	36,826	4,337,907	238,517	835,544	52,472	951,020	67,928
Sharks			20,575	411				
Sheepshead			1,706	213				
Skates	60,000	60	10,925	165				
Smelt	1,375	260	8,780	1,599				
Spanish mackerel	1,729	339	7,525	1,500				
Spot	3,750	190	35,900	1,560			15,000	1,048
Squeteagues	6,339,600	212,623	10,699,301	253,200			773,300	15,473
Striped bass	52,766	7,075	66,012	9,535	6,300	687	40,397	4,836
Sturgeon	9,506	633	227,520	12,622	11,250	506	83,800	4,555
Sturgeon caviar	579	377	8,432	7,115			7,495	6,883
Suckers	91,753	4,450	46,500	3,308	4,300	162	13,470	532
Sunfish	12,248	797						
Swellfish	60,000	60						
Swordfish	7,000	350	8,000	580				
Tautog	58,870	2,020	145,475	4,007			6,000	300
Tomcod	114,350	3,250	6,985	347				
Whitebait	20,010	1,278						
Whiting or silver hake	60,500	788	676,595	11,515				
Other fish			660	14				
Clams, hard	1,336,016	303,599	2,165,888	351,758			10,064	1,593
Clams, soft	740,930	65,400	973,150	70,450				
Clams, surf	92,080	6,720	67,200	6,000				
Mussels	159,100	4,590	1,392,750	2,115				
Oysters, market	20,079,549	3,413,893	9,164,274	1,298,508	630,000	90,000	807,800	47,513
Oysters, seed	3,225,775	366,459	5,781,615	393,445	200,900	14,290	883,225	46,171
Scallops	892,794	145,646						
Shells	5,832,000	4,512						
Squid	79,060	2,340	80,909	2,064				
Crabs, hard	810,920	8,314	224,499	8,658				
Crabs, soft	15,140	770	125,567	19,600			134,467	5,960
King crabs			1,638,000	6,518			665,000	2,385
Lobsters	229,697	27,059	141,340	18,269			2,600	286
Shrimp			4,949	1,425				
Porpoise			500	2				
Terrapin	605	705	4,700	4,450			676	531
Turtles			34,901	727			40,210	2,888
Total	277,649,747	6,230,558	90,108,068	3,385,415	2,046,294	167,499,	5,608,289,	259,590

Quantity and Value of Products Taken in the Fisheries of the Middle Atlantic States in 1904—Continued.

Species.	Maryland.		Virginia.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore					30,970	$450
Alewives, fresh	9,589,430	$55,263	14,309,226	$87,083	26,258,944	171,802
Alewives, salted	4,895,540	82,719	294,640	3,650	5,453,180	90,794
Black bass	14,150	1,325	153,600	13,192	168,170	14,567
Bluefish	91,460	3,855	566,765	27,362	14,795,651	707,844
Bonito	3,150	102	14,460	505	925,136	37,614
Butterfish	375,062	9,890	1,335,391	36,616	3,616,683	113,835
Catfish	491,435	18,381	556,325	21,920	1,422,886	62,676
Cero	5,130	156			10,561	418
Cod	310	12			2,433,450	106,547
Crevallé			270,125	7,409	271,545	7,439
Croaker	165,840	2,688	3,842,709	69,321	4,376,040	79,584
Drum	30,975	301	192,495	2,519	453,080	4,342
Eels, fresh	250,165	10,705	86,350	4,007	1,781,641	112,647
Eels, salted	76,300	2,214			76,300	2,214
Eels, smoked					325	80
Flounders	35,005	1,192	248,640	7,587	3,160,316	113,688
German carp	139,280	4,633	141,625	4,466	1,229,320	75,033
Gizzard shad	7,225	136	32,675	653	39,900	789
Haddock					448,285	17,951
Hake					457,960	12,077
Hickory shad	4,500	90	355,883	7,296	374,653	7,696
Hogfish			44,895	4,451	44,895	4,451
Horse mackerel					12,805	187
Kingfish	7,610	940	118,390	6,243	169,206	12,250
Mackerel	16,240	1,296			342,578	21,960
Menhaden	9,849,400	20,189	247,918,766	515,413	511,777,571	1,338,621
Mullet, fresh	24,935	745	239,000	7,208	321,935	10,138
Mullet, salted					3,000	45
Mummichog					124,000	620
Perch, white	545,053	30,841	635,017	29,501	1,658,845	93,596
Perch, yellow	265,470	10,685	180,550	6,693	471,893	19,108
Pike and pickerel	42,317	3,716	36,400	2,954	92,382	7,459
Pollock					83,734	1,749
Pompano	300	45	47,840	3,400	48,140	3,445
Round herring					132,250	2,061
Salmon, Atlantic					36	18
Scup	31,610	2,558	49,260	1,545	2,629,380	84,238
Sea bass	59,600	2,580	1,000	44	2,953,362	122,103
Sea robins					298,230	645
Shad	2,912,249	159,772	7,419,899	439,625	16,954,738	995,140
Sharks					20,575	411
Sheepshead	950	68	20,745	904	23,401	1,185
Skates					70,925	225
Smelt					10,155	1,859
Spanish mackerel	1,950	241	357,000	39,390	368,204	41,470
Spot	13,480	411	872,800	37,769	940,930	40,978
Squeteagues	785,215	23,207	6,951,068	164,979	25,548,484	669,482
Striped bass	721,240	72,207	451,366	41,803	1,338,081	136,143
Sturgeon	164,215	8,313	180,675	15,134	676,996	41,763
Sturgeon caviar	20,600	18,722	23,211	16,848	60,317	49,945
Suckers	2,775	72	52,645	1,060	211,443	9,584
Sunfish	7,450	487	24,800	514	44,498	1,798
Swellfish					60,000	60
Swordfish					15,000	930
Tautog					210,345	6,327
Tomcod					121,335	3,597
Whitebait					20,010	1,278
Whiting or silver hake					737,095	12,303
Other fish	4,000	10			4,660	24
Clams, hard	37,800	4,880	1,659,572	220,973	5,209,340	882,803
Clams, soft					1,714,080	135,850
Clams, surf					159,280	12,720
Mussels					1,551,850	6,705
Oysters, market	30,284,905	2,400,642	40,043,290	3,009,005	101,009,818	10,259,561
Oysters, seed	722,645	17,032	13,242,733	450,671	24,056,893	1,288,068
Scallops					892,794	145,646
Shells					5,832,000	4,512
Squid	14,000	418			173,969	4,822
Crabs, hard	12,665,282	168,996	10,356,052	179,575	24,056,753	365,543
Crabs, soft	5,732,865	189,851	1,910,654	92,909	7,918,693	309,090
King crabs					2,303,000	8,903
Lobsters					373,637	45,614
Shrimp	2,400	800			7,349	2,225
Porpoise					500	2
Frogs			3,220	690	3,220	690
Terrapin	3,923	2,718	1,706	320	11,610	8,724
Turtles	13,400	456	72,335	1,144	160,846	5,215
Total	81,128,866	3,336,560	355,315,798	5,584,354	811,857,062	18,963,976

SUPPLEMENTARY STATEMENT OF CERTAIN OF THE ABOVE PRODUCTS IN BUSHELS AND NUMBER.

Products.	New York.		New Jersey.		Pennsylvania.		Delaware.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Clams, hard...bushels..	167,002	$303,599	270,736	$351,758	....	....	1,258	$1,593
Clams, soft........do....	74,093	65,400	97,315	70,450	....	....	....	....
Clams, surf......do....	11,510	6,720	8,400	6,000	....	....	....	....
Mussels...........do....	15,910	4,590	30,215	2,115	....	....	....	....
Oysters market..do....	2,868,507	3,413,893	1,309,182	1,298,508	90,000	$90,000	115,400	47,513
Oyster, seed.....do....	460,825	366,459	825,945	393,445	28,700	14,290	126,175	46,171
Scallops...........do....	148,799	145,646	....	....	....	....	....	....
Shells.............do....	97,200	4,512	....	....	....	....	....	....
Crabs, hard. .number..	2,432,760	8,314	673,497	8,658	....	....	....	....
Crabs, soft........do....	45,420	770	376,701	19,600	....	....	403,401	5,960
King crabs........do....	....	....	819,000	6,518	....	....	332,500	2,385

Products.	Maryland.		Virginia.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Clams, hard...bushels..	4,725	$4,880	207,446	$220,973	651,167	$882,803
Clams, soft.......do....	....	....	....	....	171,408	135,850
Clams, surf ......do....	....	....	....	....	19,910	12,720
Mussels...........do....	....	....	....	....	46,125	6,705
Oysters, market .do....	4,326,415	2,400,642	5,720,470	3,009,005	14,429,974	10,259,561
Oysters, seed ....do....	103,235	17,032	1,891,819	450,671	3,436,699	1,288,068
Scallops...........do....	....	....	....	....	148,799	145,646
Shells.............do....	....	....	....	....	97,200	4,512
Crabs, hard...number..	37,995,846	168,996	31,068,156	179,575	72,170,259	365,543
Crabs, soft.......do....	17,198,595	189,851	5,731,962	92,909	23,756,079	309,090
King crabs.......do....	....	....	....	....	1,151,500	8,903

COMPARATIVE STATEMENT OF THE EXTENT OF THE FISHERIES OF THE MIDDLE ATLANTIC STATES IN 1901 AND 1904.

State.	Persons engaged.				Capital invested.			
	1901.	1904.	Decrease (−) in 1904.		1901.	1904.	Increase (+) or decrease (−) in 1904.	
			Number.	Percentage.			Amount.	Percentage.
New York..........	11,564	11,493	− 71	− 0.61	$9,444,271	$10,621,616	+$1,177,345	+12.47
New Jersey..........	12,030	9,094	−2,936	−24.41	2,729,571	2,685,796	− 43,775	− 1.60
Pennsylvania.......	2,484	1,412	−1,072	−43.16	2,110,162	2,097,715	− 12,447	− 0.59
Delaware............	1,998	1,899	− 99	− 4.96	657,197	669,995	+ 12,798	+ 1.95
Maryland............	36,260	30,337	−5,923	−16.33	6,506,066	5,983,465	− 522,601	− 8.03
Virginia..............	29,325	28,868	− 457	− 1.56	3,633,104	4,614,934	+ 981,830	+27.02
Total.........	93,661	83,103	−10,558	−11.27	25,080,371	26,673,521	+ 1,593,150	+ 6.35

States.	Products.							
	Pounds.				Value.			
	1901.	1904.	Increase (+) or decrease (−) in 1904.		1901.	1904.	Increase (+) or decrease (−) in 1904.	
			Amount.	Per centage.			Amount.	Per centage.
New York.....	228,092,285	277,649,747	+49,557,462	+21.73	$3,894,270	$6,230,558	+$2,336,288	+59.99
New Jersey....	117,930,964	90,108,068	−27,822,896	−23.59	4,755,522	3,385,415	− 1,370,107	−28.81
Pennsylvania..	6,029,538	2,046,294	− 3,983,244	−66.06	251,491	167,499	− 83,992	−33.40
Delaware......	5,835,186	5,608,289	− 226,897	− 3.89	203,372	259,590	+ 56,218	+27.64
Maryland......	82,975,245	81,128,866	− 1,846,379	− 2.23	3,767,461	3,336,560	− 430,901	−11.44
Virginia.......	378,183,358	355,315,798	−22,867,560	− 6.05	4,613,384	5,584,354	+ 970,970	+21.05
Total....	819,046,576	811,857,062	− 7,189,514	− 0.88	17,485,500	18,963,976	+ 1,478,476	+ 8.46

FISHERIES OF NEW YORK.

GENERAL AND COMPARATIVE STATISTICS.

New York now ranks first among the Middle Atlantic States in the amount of capital invested in the fishery industries and in the value of the products. In 1904 these industries gave employment to 11,493 persons and utilized $10,621,616 worth of vessels, boats, fishing apparatus, shore property, and cash capital. The yield aggregated 277,649,747 pounds, for which the fishermen received $6,230,558.

The returns for 1904, compared with those for 1901, show a decrease of 71 in the number of persons employed, but an increase of $1,177,345 in the investment, and 49,557,462 pounds in the quantity and $2,336,288 in the value of the products. There has been a small increase in the number of persons on fishing and transporting vessels, and in the shore industries, but a decrease of 236 in the number employed in the shore fisheries. The decrease in the number of shore or boat fishermen is due in a large measure to a falling off in the Hudson River fisheries. Practically every branch of the fisheries of that stream has gone down, the number of persons employed in 1901 being 1,685 and in 1904 only 1,287.

The three following tables show, in condensed form, the number of persons engaged, the number and value of vessels, boats, apparatus of capture, the value of shore and accessory property, the amount of cash capital, and the quantity and value of the products of the fisheries of New York in 1904.

NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF NEW YORK IN 1904.

How engaged.	Number.
On vessels fishing	3,158
On vessels transporting	484
In shore or boat fisheries	4,854
Shoresmen	2,997
Total	11,493

INVESTMENT IN THE FISHERIES OF NEW YORK IN 1904.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	482	$1,314,275	Apparatus—shore fisheries:		
Tonnage	9,880		Seines	209	$15,127
Outfit		455,120	Gill nets	810	35,095
Vessels transporting	204	290,375	Pound nets	306	105,965
Tonnage	3,720		Fyke nets	8,946	41,460
Outfit		30,395	Dip nets	18	92
Boats, sail and row	4,781	255,069	Lines		2,303
Boats, motor	113	65,775	Eel pots	7,626	7,539
Apparatus—vessel fisheries:			Lobster pots	3,245	4,225
Seines	86	42,850	Spears	259	234
Gill nets	283	7,085	Dredges	1,364	4,703
Lines		5,069	Tongs	1,734	8,173
Eel pots	465	425	Rakes	1,205	6,822
Lobster pots	3,160	5,490	Hoes	657	609
Dredges	1,578	10,996	Shore property		4,314,115
Tongs	337	1,428	Cash capital		3,590,500
Rakes	67	296			
Hoes	5	6	Total		10,621,616

PRODUCTS OF THE FISHERIES OF NEW YORK IN 1904.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives	1,021,183	$16,181	Squeteague	6,339,600	$212,623
Bluefish	11,413,786	556,527	Striped bass	52,766	7,075
Bonito	310,025	12,508	Sturgeon	9,506	633
Bullheads	121,116	6,052	Caviar	579	377
Butterfish	579,150	27,698	Suckers	68,003	3,220
Carp, American	23,750	1,230	Sunfish	12,248	797
Carp, German	253,205	15,913	Swellfish	60,000	60
Catfish	16,200	943	Swordfish	7,000	350
Cod	1,170,485	52,710	Tautog	58,870	2,020
Eels	708,937	53,832	Tomcod or frost fish	114,350	3,250
Flounders	1,820,332	67,159	Whitebait	20,010	1,278
Haddock	307,685	11,633	Whiting	60,500	788
Hake	38,850	1,067	Crabs, hard	810,920	8,314
Kingfish	22,380	2,480	Crabs, soft	[a] 15,140	770
Ling	29,260	460	Lobsters	229,697	27,059
Mackerel	212,595	13,219	Squid	79,060	2,340
Menhaden	216,399,600	693,929	Clams, hard, public	[b] 957,096	199,851
Mummichog	124,000	620	Clams, hard, private	[c] 378,920	103,748
Perch, white	39,375	2,945	Clams, soft	[d] 740,930	65,400
Perch, yellow	25,273	1,695	Oysters, market, public	[e] 145,635	24,986
Pickerel	695	58	Oysters, market, private	[f] 19,933,914	3,388,907
Pike	1,320	132	Oysters, seed, public	[g] 762,475	74,536
Pollock	73,500	1,503	Oysters, seed, private	[h] 2,463,300	291,923
Scup	1,493,828	48,068	Mussels	[i] 159,100	4,590
Sea bass	320,116	21,546	Scallops	[k] 892,794	145,646
Sea robins	261,030	297	Skimmers or surf clams	[l] 92,080	6,720
Shad	498,119	36,826	Terrapin	605	705
Skates	60,000	60	Shells	[m] 5,832,000	4,512
Smelt	1,375	260			
Spanish mackerel	1,729	339	Total	277,649,747	6,230,558
Spot	3,750	190			

[a] 45,420 in number.
[b] 119,637 bushels.
[c] 47,365 bushels.
[d] 74,093 bushels.
[e] 20,805 bushels.
[f] 2,847,702 bushels.
[g] 108,925 bushels.
[h] 351,900 bushels.
[i] 15,910 bushels.
[k] 148,799 bushels.
[l] 11,510 bushels.
[m] 97,200 bushels.

THE FISHERIES BY COUNTIES.

More than one-half of the fishery products of New York State are taken by the fishermen of Suffolk County. In 1904 the yield aggregated 234,338,945 pounds in weight and $3,292,978 in value, consisting principally of oysters and other shellfish, menhaden, squeteague, flounders, butterfish, cod, eels, scup, and a large number of minor species. The fisheries of Nassau County rank next, with an aggregate value of $882,957, and New York, Richmond, Kings, and Queens counties follow, with a value of $782,763, $464,400, $429,981, and $265,930, respectively.

The extent of the fisheries in each county is given in detail in the following tables:

STATEMENT, BY COUNTIES, OF THE NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF NEW YORK IN 1904.

Counties.	On vessels fishing	On vessels transporting.	In shore or boat fisheries.	Shoresmen.	Total.
Albany			65	15	80
Columbia			157	1	158
Dutchess			260		260
Greene			85		85
Kings	42	47	404	22	515
Nassau	239	63	660	45	1,007
New York	978	33	53	1,994	3,058
Orange			93		93
Putnam			12		12
Queens	24	62	235	10	331
Rensselaer			102		102
Richmond	122	88	392	7	609
Rockland			114		114
Suffolk	1,745	191	1,680	903	4,519
Ulster			256		256
Westchester	8		286		294
Total	3,158	484	4,854	2,997	11,493

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, AND APPARATUS EMPLOYED IN THE FISHERIES OF NEW YORK IN 1904.

Items.	Albany.		Columbia.		Dutchess.		Greene.		Kings.		Nassau.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing									16	$16,075	66	$143,375
Tonnage									125		741	
Outfit										4,462		22,062
Vessels transporting									22	32,800	26	44,575
Tonnage									296		484	
Outfit										3,850		3,380
Boats, sail and row	32	$660	95	$3,100	156	$6,005	53	$1,207	484	28,697	810	38,846
Boats, motor									8	10,660	30	17,720
Apparatus—vessel fisheries:												
Gill nets											10	1,265
Lines										79		720
Eel pots									265	265		
Lobster pots									200	400	300	300
Dredges									16	245	174	2,234
Tongs									2	8	11	72
Apparatus—shore fisheries:												
Seines	8	695	18	1,135	11	570	11	640			21	1,970
Gill nets			39	1,415	120	5,945	22	665	7	645	3	235
Pound nets									2	1,000		
Fyke nets	212	1,215	336	1,680	537	2,660	96	490	20	240		
Dip nets	4	20	10	50			2	10				
Lines										370		
Eel pots									474	584	1,325	1,176
Lobster pots									760	745		
Spears									28	22	67	55
Dredges									28	332	166	993
Tongs									338	1,889	380	1,719
Rakes									110	536	290	1,322
Hoes									145	136	124	112
Shore property		27,305		1,015		1,410		605		38,750		97,140
Cash capital		15,000								6,000		
Total		44,895		8,395		16,590		3,617		148,790		379,271

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, AND APPARATUS EMPLOYED IN THE FISHERIES OF NEW YORK IN 1904—Continued.

Items.	New York.		Orange.		Putnam.		Queens.		Rensselaer.		Richmond.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	69	$377,110					8	$15,150			28	$61,400
Tonnage	3,450						86				311	
Outfit		219,550						1,875				19,205
Vessels transporting	14	16,250					24	40,225			40	35,850
Tonnage	170						516				473	
Outfit		2,275						2,691				6,680
Boats, sail and row	55	3,760	56	$2,170	8	$275	288	12,369	45	$890	247	21,980
Boats, motor							4	3,420			7	8,000
Apparatus—vessel fisheries:												
Seines	19	9,300										
Gill nets	245	2,280										
Lines		4,178										
Lobster pots	1,500	3,000									500	1,000
Dredges	16	645					30	234			68	2,430
Tongs											19	140
Rakes	4	45									19	122
Apparatus—shore fisheries:												
Seines	3	185	11	755	3	165			14	1,125		
Gill nets	4	75	35	1,735	1	100			4	80	115	1,470
Pound nets											2	1,200
Fyke nets			162	967	11	66			186	1,005	10	400
Dip nets									2	12		
Eel pots							535	659			60	50
Lobster pots											360	700
Spears							15	15				
Dredges	8	160					40	260			14	370
Tongs	38	232					194	816			229	1,394
Rakes	45	354					59	261			235	1,664
Hoes							55	43				
Shore property		3,481,340		455		60		19,750		770		27,825
Cash capital		3,389,500										
Total		7,510,239		6,082		666		97,768		3,882		191,880

Items.	Rockland.		Suffolk.		Ulster.		Westchester.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing			293	$695,165			2	$6,000	482	$1,314,275
Tonnage			5,144				23		9,880	
Outfit				187,266				700		455,120
Vessels transporting			78	120,675					204	290,375
Tonnage			1,781						3,720	
Outfit				11,519						30,395
Boats, sail and row	65	$2,685	1,992	118,370	148	$6,570	247	7,485	4,781	255,069
Boats, motor			64	25,975					113	65,775
Apparatus—vessel fisheries:										
Seines			67	33,550					86	42,850
Gill nets			28	3,540					283	7,085
Lines				92						5,069
Eel pots			200	160					465	425
Lobster pots			660	790					3,160	5,490
Dredges			1,266	5,143			8	65	1,578	10,996
Tongs			305	1,208					337	1,428
Rakes			44	129					67	296
Hoes			5	6					5	6
Apparatus—shore fisheries:										
Seines	8	375	77	5,522	13	1,175	11	815	209	15,127
Gill nets	60	3,640	186	6,775	123	5,910	91	6,405	810	35,095
Pound nets			302	103,765					306	105,965
Fyke nets	65	390	6,720	29,115	384	2,002	207	1,230	8,946	41,460
Dip nets									18	92
Lines				1,933						2,303
Eel pots			4,942	4,780			290	290	7,626	7,539
Lobster pots			2,020	2,555			105	225	3,245	4,225
Spears			132	125			17	17	259	234
Dredges			1,108	2,588					1,364	4,703
Tongs			546	2,087			9	36	1,734	8,173
Rakes			420	2,295			46	390	1,205	6,822
Hoes			243	228			90	90	657	609
Shore property		585		611,050		1,160		4,895		4,314,115
Cash capital				180,000						3,590,500
Total		7,675		2,156,406		16,817		28,643		10,621,616

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF NEW YORK IN 1904.

Species.	Albany.		Columbia.		Dutchess.		Greene.		Kings.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	53,610	$935	163,998	$3,339	52,785	$1,049	44,310	$830	9,850	$290
Bluefish									38,350	2,299
Bullheads	6,089	305	21,008	1,051	24,050	1,166	5,842	291		
Butterfish									58,700	1,170
Carp, American	50	3	3,570	179	6,350	315	700	35		
Carp, German	14,976	804	21,210	942	13,179	645	11,720	625		
Cod									39,370	1,920
Eels	695	65	984	93	1,830	164	280	26	95,120	8,319
Flounders									32,300	1,607
Haddock									2,450	116
Hake									22,550	616
Ling									8,000	193
Menhaden									3,000	42
Perch, white			1,640	123	2,155	168	250	20		
Perch, yellow	864	72	5,874	377	4,925	325	2,567	191		
Pickerel	125	12			50	4	20	2		
Scup									6,400	320
Sea bass									6,920	528
Shad	296	29	21,194	1,595	140,843	9,835	6,400	440	17,260	1,384
Spot									3,750	190
Squeteague									28,300	1,223
Striped bass			300	36	760	98	40	5		
Sturgeon	300	18	208	15	1,795	101	1,760	126		
Caviar					145	105	40	30		
Suckers	10,905	548	9,350	397	7,620	352	5,578	256		
Sunfish	1,055	75	1,230	74	3,725	215	313	21		
Tautog									17,050	852
Tomcod or frostfish					4,100	205			250	10
Crabs, hard									2,100	64
Crabs, soft									2,000	75
Lobsters									31,565	2,746
Clams, hard, public reefs									116,360	20,082
Clams, hard, private areas									119,240	35,945
Clams, soft									303,250	27.006
Oysters, market, private areas									1,622,719	321,034
Mussels									85,000	1,950
Total	88,965	2,866	250,566	8,221	264,312	14,747	79,820	2,898	2,671,854	429,981

Species.	Nassau.		New York.		Orange.		Putnam.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives					10,000	$300		
Bluefish	118,325	$8,399	10,913,626	$526,834				
Bonito	4,900	245	60,310	2,032				
Bullheads			50	3	14,135	713	2,532	$137
Carp, American					3,650	210	1,800	108
Carp, German			6,450	520	14,775	863	4,000	218
Cod	300,900	14,385	281,675	12,265				
Eels	124,870	9,598			1,158	96	10	1
Flounders	62,350	2,558	1,062	57				
Haddock	80,275	3,265	13,800	502				
Mackerel			158,369	9,538				
Menhaden			13,000,000	31,750				
Perch, white					3,280	233	120	9
Perch, yellow			150	12	2,935	185	400	37
Scup	3,700	154	862,750	28,333				
Sea bass			80,531	3,590				
Shad			2,840	260	21,844	1,538	1,500	110
Spanish mackerel	480	65						
Squeteague	325,550	13,690	1,773,425	63,237				
Striped bass	5,690	818	300	33	1,770	240	100	14
Sturgeon					200	10		
Suckers			650	21	11,760	584	450	22
Sunfish					435	25	225	18
Tomcod or frostfish					42,870	721		
Crabs, soft	13,140	695						
Lobsters	7,500	975	47,108	6,473				
Clams, hard, public reefs	264,216	55,646	24,480	4,580				
Clams, hard, private areas	107,680	31,525	40,000	10,260				
Clams, soft	115,700	8,915						
Oysters, market, private areas	3,847,270	661,404	566,650	81,638				
Oysters, seed, public reefs	115,430	11,880	10,150	825				
Oysters, seed, private areas	448,700	51,550						
Mussels	74,100	2,640						
Scallops	11,400	1,350						
Skimmers or surf clams	25,600	3,200						
Total	6,057,776	882,957	27,844,376	782,763	128,812	5,718	11,137	674

Statement, by Counties, of the Yield of the Fisheries of New York in 1904—Continued.

Species.	Queens.		Rensselaer.		Richmond.		Rockland.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives			100,460	$1,690	6,000	$198	5,220	$166
Bluefish					2,400	128		
Bullheads			4,400	236			2,930	146
Carp, German			15,373	741			300	18
Eels	40,850	$3,497	674	62	3,000	270	1,320	118
Perch, white			400	36			6,365	419
Perch, yellow			795	50			300	18
Pickerel			245	22				
Shad			1,712	135	62,840	5,051	30,794	2,434
Squeteague							500	32
Striped bass							12,974	1,583
Sturgeon			460	37			525	38
Suckers			7,707	394			1,500	74
Sunfish			515	33				
Crabs, hard					2,840	80		
Lobsters					55,460	5,900		
Clams, hard, public reefs	67,000	14,569			82,480	9,795		
Clams, hard, private areas	52,800	14,850			16,800	2,048		
Clams, soft	26,200	2,544						
Oysters, market, private areas	1,234,100	230,470			2,758,875	395,819		
Oysters, seed, public reefs					471,800	41,591		
Skimmers or surf clams					66,480	3,520		
Total	1,420,950	265,930	132,741	3,436	3,528,975	464,400	62,728	5,046

Species.	Suffolk.		Ulster.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	425,420	$4,940	139,280	$2,227	10,250	$217	1,021,183	$16,181
Bluefish	341,085	18,867					11,413,786	556,527
Bonito	244,815	10,231					310,025	12,508
Bullheads			25,950	1,297	14,130	707	121,116	6,052
Butterfish	520,450	26,528					579,150	27,698
Carp, American			3,450	171	4,180	209	23,750	1,230
Carp, German	106,670	8,288	27,027	1,352	17,525	897	253,205	15,913
Catfish	16,200	943					16,200	943
Cod	548,540	24,140					1,170,485	52,710
Eels	414,155	29,260	2,361	213	21,630	2,050	708,937	53,832
Flounders	1,724,620	62,937					1,820,332	67,159
Haddock	211,160	7,750					307,685	11,633
Hake	16,300	451					38,850	1,067
Kingfish	22,380	2,480					22,380	2,480
Ling	21,260	267					29,260	460
Mackerel	54,226	3,681					212,595	13,219
Menhaden	203,396,600	662,137					216,399,600	693,929
Mummichog	124,000	620					124,000	620
Perch, white	19,900	1,591	760	58	4,505	288	39,375	2,945
Perch, yellow			3,660	256	2,803	172	25,273	1,695
Pickerel			35	3	220	15	695	58
Pike	1,320	132					1,320	132
Pollock	73,500	1,503					73,500	1,503
Scup	620,978	19,261					1,493,828	48,068
Sea bass	232,665	17,428					320,116	21,546
Sea robins	261,030	297					261,030	297
Shad	12,684	1,235	109,842	7,738	68,070	5,042	498,119	36,826
Skates	60,000	60					60,000	60
Smelt	1,375	260					1,375	260
Spanish mackerel	1,249	274					1,729	339
Spot							3,750	190
Squeteague	4,211,825	134,441					6,339,600	212,623
Striped bass	22,135	3,188			8,697	1,060	52,766	7,075
Sturgeon			3,913	267	345	21	9,506	633
Caviar			394	242			579	377
Suckers			4,900	212	7,583	360	68,003	3,220
Sunfish			3,640	268	1,110	68	12,248	797
Swellfish	60,000	60					60,000	60
Swordfish	7,000	350					7,000	350
Tautog	41,820	1,168					58,870	2,020
Tomcod or frostfish	59,330	1,780	500	20	7,300	514	114,350	3,250
Whitebait	20,010	1,278					20,010	1,278
Whiting	60,500	788					60,500	788
Crabs, hard	805,980	8,170					810,920	8,314
Crabs, soft							15,140	770
Lobsters	83,414	10,035			4,650	930	229,697	27,059

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF NEW YORK IN 1904—Continued.

Species.	Suffolk.		Ulster.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Squid	79,060	$2,340					79,060	$2,340
Clams, hard, public reefs	345,280	84,315			57,280	$10,864	957,096	199,851
Clams, hard, private areas	42,400	9,120					378,920	103,748
Clams, soft	261,580	22,923			34,200	4,012	740,930	65,400
Oysters, market, public reefs	143,535	24,686			2,100	300	145,635	24,986
Oysters, market, private areas	9,818,200	1,683,737			86,100	14,805	19,933,914	3,388,907
Oysters, seed, public reefs	165,095	20,240					762,475	74,536
Oysters, seed, private areas	1,925,350	229,535			89,250	10,838	2,463,300	291,923
Mussels							159,100	4,590
Scallops	881,394	144,296					892,794	145,646
Skimmers or surf clams							92,080	6,720
Terrapin	455	455			150	250	605	705
Shells	5,832,000	4,512					5,832,000	4,512
Total	234,338,945	3,292,978	325,712	14,324	442,078	53,619	277,649,747	6,230,558

THE PRODUCTS BY APPARATUS.

The most important forms of fishing apparatus employed in the fisheries of New York in 1904 in respect to value of products secured were the dredges, tongs, rakes, etc., used in taking shellfish and crabs. The catch with these appliances aggregated $4,314,639 in value, or 69 per cent of the total yield of the state, and consisted of oysters, 3,329,332 bushels, valued at $3,780,352; hard clams, 167,002 bushels, $303,599; soft clams, 74,093 bushels, $65,400; scallops, 148,799 bushels, $145,646; skimmers, or surf clams, 11,510 bushels, $6,720; mussels, 15,910 bushels, $4,590; shells, 97,200 bushels, $4,512; hard crabs, 316,800 pounds, $3,745, and soft crabs, 2,000 pounds, $75.

The seine is the most important apparatus used in this state for the capture of fish, the 295 seines operated in 1904 taking 214,099,725 pounds, with a value of $826,597 at first hand. Of this quantity 210,110,600 pounds consisted of menhaden, valued at $681,178. Other species of importance were squeteague, 1,956,635 pounds, $70,969; scup, 858,550 pounds, $28,171; alewives, 429,035 pounds, $7,201; German carp, 206,065 pounds, $13,450; bluefish, 81,379 pounds, $5,089; bonito, 60,310 pounds, $2,032, and flounders, 72,022 pounds, $2,990.

Of the remaining product lines took 13,495,155 pounds, $623,364; pound nets, 11,306,598 pounds, $242,808; gill nets, 3,786,531 pounds, $93,553; fyke nets, 1,380,761 pounds, $53,060; pots, 691,598 pounds, $61,211; spears, 179,120 pounds, $13,570, and dip nets, 33,215 pounds, $1,756.

The following tables present, by apparatus of capture, the products of the vessel and shore fisheries of New York in 1904:

STATEMENT, BY COUNTIES, OF THE CATCH BY DREDGES, TONGS, RAKES, ETC., IN NEW YORK IN 1904.

Species.	Kings.		Nassau.		New York.		Queens.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Clams, hard—								
Public reefs	7,360	$1,270	18,728	$2,845	6,400	$1,000	3,200	$540
Oysters, market—								
Private areas	79,450	12,970	1,914,500	300,395	497,700	71,490	257,600	55,910
Oysters, seed—								
Public reefs			78,120	8,320				
Private areas			448,700	51,550				
Skimmers			25,600	3,200				
Total	86,810	14,240	2,485,648	366,310	504,100	72,490	260,800	56,450
Shore fisheries:								
Crabs, soft	2,000	75						
Clams, hard—								
Public reefs	109,000	18,812	245,488	52,801	18,080	3,580	63,800	14,029
Private areas	119,240	35,945	107,680	31,525	40,000	10,260	52,800	14,850
Clams, soft	303,250	27,006	115,700	8,915			26,200	2,544
Mussels	85,000	1,950	74,100	2,640				
Oysters, market—								
Private areas	1,543,269	308,064	1,932,770	361,009	68,950	10,148	976,500	174,560
Oysters, seed—								
Public reefs			37,310	3,560	10,150	825		
Scallops			11,400	1,350				
Total	2,161,759	391,852	2,524,448	461,800	137,180	24,813	1,119,300	205,983
Grand total	2,248,569	406,092	5,010,096	828,110	641,280	97,303	1,380,100	262,433

Species.	Richmond.		Suffolk.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Crabs, hard			148,300	$2,060			148,300	$2,060
Clams, hard—								
Public reefs	29,600	$3,592	93,304	25,296			158,592	34,543
Private areas	16,800	2,048	42,400	9,120			59,200	11,168
Clams, soft			2,880	360			2,880	360
Oysters, market—								
Public reefs			55,685	9,572			55,685	9,572
Private areas	[a]2,062,900	296,710	[b]9,377,620	1,601,832	86,100	$14,805	14,275,870	2,354,112
Oysters, seed—								
Public reefs	28,000	2,430	17,465	2,410			123,585	13,160
Private areas			[c]1,916,950	228,775	89,250	10,838	2,454,900	291,163
Scallops			475,542	77,975			475,542	77,975
Shells			4,992,000	3,812			4,992,000	3,812
Skimmers	48,880	2,150					74,480	5,350
Total	2,186,180	306,930	17,122,146	1,961,212	175,350	25,643	22,821,034	2,803,275
Shore fisheries:								
Crabs, hard			168,500	1,685			168,500	1,685
Crabs, soft							2,000	75
Clams, hard—								
Public reefs	52,880	6,203	251,976	59,019	57,280	10,864	798,504	165,308
Private areas							319,720	92,580
Clams, soft			258,700	22,563	34,200	4,012	738,050	65,040
Mussels							159,100	4,590
Oysters, market—								
Public reefs			87,850	15,114	2,100	300	89,950	15,414
Private areas	695,975	99,109	440,580	81,905			5,658,044	1,034,795
Oysters, seed—								
Public reefs	443,800	39,161	147,630	17,830			638,890	61,376
Private areas			8,400	760			8,400	760
Scallops			405,852	66,321			417,252	67,671
Shells			840,000	700			840,000	700
Skimmers	17,600	1,370					17,600	1,370
Total	1,210,255	145,843	2,609,488	265,897	93,580	15,176	9,856,010	1,511,364
Grand total	3,396,435	452,773	19,731,634	2,227,109	268,930	40,819	32,677,044	4,314,639

[a] Includes 560,000 pounds, worth $80,000, taken up by vessels owned in Connecticut and elsewhere.
[b] Includes 2,088,870 pounds, worth $324,135, taken up by vessels owned in Connecticut and elsewhere.
[c] Includes 323,050 pounds, worth $39,670, taken up by vessels owned in Connecticut and elsewhere.

STATEMENT, BY COUNTIES, OF THE YIELD OF THE SEINE FISHERIES OF NEW YORK IN 1904.

Species.	Albany.		Columbia.		Dutchess.		Greene.		Nassau.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Alewives	53,480	$931	148,130	$3,011	5,525	$109	29,510	$530		
Bluefish									20,800	$1,483
Bullheads	1,200	60	3,430	172	730	35	510	25		
Carp, American	50	3	3,080	154	5,300	267	700	35		
Carp, German	5,386	249	7,500	257	6,744	321	5,350	277		
Eels			26	3			20	2	4,500	360
Flounders									57,400	2,360
Perch, white			540	44	150	12	250	20		
Perch, yellow			120	8	445	34				
Scup									3,700	154
Shad	296	29	8,124	640	6,515	436	4,300	296		
Spanish mackerel									100	18
Squeteague									165,500	6,825
Striped bass					440	59			5,690	818
Sturgeon	300	18								
Suckers	300	15	1,788	81	2,540	115	320	15		
Sunfish					355	27	50	3		
Total	61,012	1,305	172,738	4,370	28,744	1,415	41,010	1,203	257,690	12,018

Species.	New York.		Orange.		Putnam.		Rensselaer.		Rockland.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value
Vessel fisheries:										
Bluefish	50,979	$2,946								
Bonito	60,310	2,032								
Flounders	1,062	57								
Menhaden	13,000,000	31,750								
Scup	854,850	28,017								
Sea bass	6,421	296								
Squeteague	1,761,375	62,744								
Total	15,734,997	127,842								
Shore fisheries:										
Alewives			500	$15			98,890	$1,655	2,300	$77
Bullheads	50	3	1,480	74	1,480	$75	360	18	420	21
Carp, American			3,650	210	1,800	108				
Carp, German	6,450	520	14,715	859	4,000	218	8,930	434	300	18
Perch, white			620	41	120	9	400	36	1,250	80
Perch, yellow	150	12	965	58	300	29	200	14		
Pickerel							60	5		
Shad			780	36			212	15	1,544	128
Squeteague									500	32
Striped bass	300	33	1,000	136	100	14			9,890	1,195
Sturgeon							460	37	325	30
Suckers	650	21	9,570	466	250	12	2,975	126	100	4
Sunfish			350	20	200	16	160	12		
Total	7,600	589	33,630	1,915	8,250	481	112,647	2,352	16,629	1,585
Grand total	15,742,597	128,431	33,630	1,915	8,250	481	112,647	2,352	16,629	1,585

STATEMENT, BY COUNTIES, OF THE YIELD OF THE SEINE FISHERIES OF NEW YORK IN 1904—Continued.

Species.	Suffolk.		Ulster.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Bluefish							50,979	$2,946
Bonito							60,310	2,032
Flounders							1,062	57
Menhaden	196,310,600	$648,228					209,310,600	679,978
Scup							854,850	28,017
Sea bass							6,421	296
Squeteague							1,761,375	62,744
Total	196,310,600	648,228					212,045,597	776,070
Shore fisheries:								
Alewives	55,000	355	35,500	$510	200	$8	429,035	7,201
Bluefish	9,600	660					30,400	2,143
Bullheads			5,490	274	1,730	87	16,880	844
Carp, American			2,800	140	4,180	209	21,560	1,126
Carp, German	106,570	8,284	24,360	1,218	15,760	795	206,065	13,450
Catfish	1,750	90					1,750	90
Cod	800	34					800	34
Eels			200	18			4,746	383
Flounders	13,560	573					70,960	2,933
Kingfish	650	85					650	85
Menhaden	800,000	1,200					800,000	1,200
Mummichog	124,000	620					124,000	620
Perch, white	14,950	1,054	200	16	550	42	19,030	1,354
Perch, yellow			630	47	2,250	136	5,060	338
Pickerel			35	3	100	7	195	15
Scup							3,700	154
Smelt	1,375	260					1,375	260
Shad			16,792	1,190	1,450	103	40,013	2,873
Spanish mackerel							100	18
Squeteague	29,260	1,368					195,260	8,225
Striped bass	14,025	1,920			2,433	305	33,878	4,480
Sturgeon			28	3			1,113	88
Suckers			1,700	74	5,100	248	25,293	1,177
Sunfish			340	32	800	48	2,255	158
White bait	20,010	1,278					20,010	1,278
Total	1,191,550	17,781	88,075	3,525	34,553	1,988	2,054,128	50,527
Grand total	197,502,150	666,009	88,075	3,525	34,553	1,988	214,099,725	826,597

NOTE.—Very large quantities of the menhaden taken in the vessel fisheries were landed at oil and fertilizer factories in Maine, Rhode Island, Delaware, Virginia, and North Carolina.

Statement, by Counties, of the Yield of the Line Fisheries of New York in 1904.

Species.	Kings.		Nassau.		New York.		Suffolk.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Bluefish	20,300	$1,147			10,862,647	$523,888	7,590	$605	10,890,537	$525,640
Bonito							425	22	425	22
Cod	18,100	890	300,900	$14,385	281,675	12,265			600,675	27,540
Flounders							42,200	1,926	42,200	1,926
Haddock	1,600	68	80,275	3,265	13,800	502			95,675	3,835
Hake	1,200	36							1,200	36
Scup					7,900	316	5,628	335	13,528	651
Sea bass	200	16			74,110	3,294	34,960	2,464	109,270	5,774
Squeteague	1,800	78			12,050	493	1,690	76	15,540	647
Swordfish							7,000	350	7,000	350
Tautog	2,550	142							2,550	142
Total	45,750	2,377	381,175	17,650	11,252,182	540,758	99,493	5,778	11,778,600	566,563
Shore fisheries:										
Bluefish	17,400	1,120					50,100	2,945	67,500	4,065
Cod	21,270	1,030					542,010	23,837	563,280	24,867
Eels	500	45					3,125	250	3,625	295
Flounders	25,800	1,282					73,370	2,955	99,170	4,237
Haddock	850	48					211,160	7,750	212,010	7,798
Hake	21,350	580					16,300	451	37,650	1,031
Ling	8,000	193					19,900	235	27,900	428
Mackerel							8,000	400	8,000	400
Pollock							70,250	1,405	70,250	1,405
Scup	6,400	320					16,670	640	23,070	960
Sea bass	6,720	512					45,250	3,103	51,970	3,615
Squeteague	18,000	805					47,800	1,550	65,800	2,355
Striped bass							2,650	410	2,650	410
Tautog	14,500	710							14,500	710
Crabs, hard							469,180	4,225	469,180	4,225
Total	140,790	6,645					1,575,765	50,156	1,716,555	56,801
Grand total	186,540	9,022	381,175	17,650	11,252,182	540,758	1,675,258	55,934	13,495,155	623,364

Statement, by Counties, of the Yield of the Dip-net Fisheries of New York in 1904.

Species.	Albany.		Columbia.		Greene.		Nassau.		Rensselaer.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:												
Alewives	100	$3									100	$3
Bullheads	200	10	80	$4							280	14
Carp, German	3,650	220	12,230	612	1,670	$92			900	$45	18,450	969
Eels	110	10	20	2							130	12
Perch, yellow			120	10							120	10
Pickerel	30	3									30	3
Suckers	760	39	150	7							910	46
Sunfish			55	4							55	4
Crabs, soft							13,140	$695			13,140	695
Total	4,850	285	12,655	639	1,670	92	13,140	695	900	45	33,215	1,756

STATEMENT, BY COUNTIES, OF THE YIELD OF THE POUND-NET FISHERIES OF NEW YORK IN 1904.

Species.	Kings.		Richmond.		Suffolk.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	9,850	$290	6,000	$198	370,420	$4,585	386,270	$5,073
Bluefish	650	32			139,690	5,728	140,340	5,760
Bonito					242,740	10,103	242,740	10,103
Butterfish	58,700	1,170			520,450	26,528	579,150	27,698
Cod					5,730	269	5,730	269
Eels					64,650	4,963	64,650	4,963
Flounders	3,100	155			600,640	22,091	603,740	22,246
Kingfish					21,730	2,395	21,730	2,395
Ling					1,360	32	1,360	32
Mackerel					19,176	907	19,176	907
Menhaden	3,000	42			4,163,000	7,869	4,166,000	7,911
Perch, white					2,300	250	2,300	250
Pollock					3,250	98	3,250	98
Scup					597,880	18,240	597,880	18,240
Sea bass					151,805	11,813	151,805	11,813
Sea robins					261,030	297	261,030	297
Shad	2,800	204	13,600	974	12,684	1,235	29,084	2,413
Skates					60,000	60	60,000	60
Spanish mackerel					1,249	274	1,249	274
Spot	3,750	190					3,750	190
Squeteague	8,500	340			3,730,690	116,609	3,739,190	116,949
Squid					79,060	2,340	79,060	2,340
Striped bass					5,380	846	5,380	846
Swellfish					60,000	60	60,000	60
Tautog					18,520	458	18,520	458
Whiting					60,500	788	60,500	788
Lobsters					2,714	375	2,714	375
Total	90,350	2,423	19,600	1,172	11,196,648	239,213	11,306,598	242,808

STATEMENT, BY COUNTIES, OF THE YIELD OF THE GILL-NET FISHERIES OF NEW YORK IN 1904.

Species.	Columbia.		Dutchess.		Greene.		Kings.		Nassau.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Bluefish									92,225	$6,535
Bonito									4,900	245
Spanish mackerel									380	47
Squeteague									144,550	6,225
Total									242,055	13,052
Shore fisheries:										
Alewives	15,868	$328	47,225	$939	14,800	$300				
Bluefish									5,300	381
Bullheads	100	5	710	36						
Carp, American			500	24						
Carp, German	155	8	2,760	137	4,000	220				
Perch, white	100	6	1,625	133						
Perch, yellow			80	6						
Shad	13,070	955	134,328	9,399	2,100	144	6,640	$640		
Squeteague									15,500	640
Striped bass	300	36	320	39						
Sturgeon	208	15	1,795	101	1,760	126				
Caviar			145	105	40	30				
Suckers	500	20	630	28	1,600	80				
Total	30,301	1,373	190,118	10,947	24,300	900	6,640	640	20,800	1,021
Grand total	30,301	1,373	190,118	10,947	24,300	900	6,640	640	262,855	14,073

STATEMENT, BY COUNTIES, OF THE YIELD OF THE GILL-NET FISHERIES OF NEW YORK IN 1904—Continued.

Species.	New York.		Orange.		Putnam.		Rensselaer.		Richmond.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Mackerel	158,369	$9,538								
Total	158,369	9,538								
Shore fisheries:										
Alewives			9,500	$285			1,460	$32		
Bluefish									2,400	$128
Bullheads			130	7						
Perch, white			2,460	180						
Shad	2,840	260	21,064	1,502	1,500	$110	1,500	120	44,040	3,687
Striped bass			770	104						
Sturgeon			200	10						
Total	2,840	260	34,124	2,088	1,500	110	2,960	152	46,440	3,815
Grand total	161,209	9,798	34,124	2,088	1,500	110	2,960	152	46,440	3,815

Species.	Rockland.		Suffolk.		Ulster.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Bluefish			61,380	$3,807					153,605	$10,342
Bonito									4,900	245
Mackerel									158,369	9,538
Menhaden			1,974,000	4,280					1,974,000	4,280
Spanish mackerel									380	47
Squeteague			200,100	6,615					344,650	12,840
Total			2,235,480	14,702					2,635,904	37,292
Shore fisheries:										
Alewives	2,920	$89			103,780	$1,717	8,350	$171	203,903	3,861
Bluefish			72,725	5,122					80,425	5,631
Bonito			1,650	106					1,650	106
Bullheads	60	3					1,500	75	2,500	126
Carp, American									500	24
Carp, German							90	5	7,005	370
Catfish			6,850	412					6,850	412
Eels							100	9	100	9
Flounders			700	39					700	39
Mackerel			27,050	2,374					27,050	2,374
Menhaden			149,000	560					149,000	560
Perch, white	5,115	339	500	35	150	12	3,805	234	13,755	939
Perch, yellow									80	6
Pickerel							120	8	120	8
Pike			1,320	132					1,320	132
Scup			800	46					800	46
Sea bass			650	48					650	48
Shad	29,250	2,306			93,050	6,548	66,620	4,939	416,002	30,610
Squeteague			202,285	8,223					217,785	8,863
Striped bass	3,084	388					3,596	452	8,070	1,019
Sturgeon	200	8			3,885	264	345	21	8,393	545
Caviar					394	242			579	377
Suckers							600	24	3,330	152
Sunfish							60	4	60	4
Total	40,629	3,133	463,530	17,097	201,259	8,783	85,186	5,942	1,150,627	56,261
Grand total	40,629	3,133	2,699,010	31,799	201,259	8,783	85,186	5,942	3,786,531	93,553

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FYKE-NET FISHERIES OF NEW YORK IN 1904.

Species.	Albany.		Columbia.		Dutchess.		Greene.		Kings.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Alewives	30	$1			35	$1				
Bullheads	4,689	235	17,398	$870	22,610	1,095	5,332	$266		
Carp, American			490	25	550	24				
Carp, German	5,940	335	1,325	65	3,675	187	700	36		
Eels	585	55	938	88	1,830	164	260	24	950	$95
Perch, white			1,000	73	380	23				
Perch, yellow	864	72	5,634	359	4,400	285	2,567	191		
Pickerel	95	9			50	4	20	2		
Shad									7,820	540
Striped bass							40	5		
Suckers	9,845	494	6,912	289	4,450	209	3,658	161		
Sunfish	1,055	75	1,175	70	3,370	188	263	18		
Tomcod					4,100	205			250	10
Total	23,103	1,276	34,872	1,839	45,450	2,385	12,840	703	9,020	645

Species.	Orange.		Putnam.		Rensselaer.		Richmond.		Rockland.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Alewives					110	$3				
Bullheads	12,525	$632	1,052	$62	4,040	218			2,450	$122
Carp, German	60	4			5,543	262				
Eels	1,158	96	10	1	674	62			1,320	118
Perch, white	200	12								
Perch, yellow	1,970	127	100	8	595	36			300	18
Pickerel					185	17				
Shad							5,200	$390		
Suckers	2,190	118	200	10	4,732	268			1,400	70
Sunfish	85	5	25	2	355	21				
Tomcod	42,870	721								
Total	61,058	1,715	1,387	83	16,234	887	5,200	390	5,470	328

Species.	Suffolk.		Ulster.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives					1,700	$38	1,875	$43
Bullheads			20,460	$1,023	10,900	545	101,456	5,068
Carp, American			650	31			1,690	80
Carp, German	100	$4	2,667	134	1,675	97	21,685	1,124
Catfish	7,600	441					7,600	441
Eels	1,025	87	2,161	195	1,630	114	12,541	1,099
Flounders	994,150	35,353					994,150	35,353
Perch, white	2,150	252	410	30	150	12	4,290	402
Perch, yellow			3,030	209	553	36	20,013	1,341
Pickerel							350	32
Shad							13,020	930
Striped bass	80	12			2,668	303	2,788	320
Suckers			3,200	138	1,883	88	38,470	1,845
Sunfish			3,300	236	250	16	9,878	631
Tautog	23,300	710					23,300	710
Tomcod	59,330	1,780	500	20			107,050	2,736
Terrapin	455	455			150	250	605	705
Crabs, hard	20,000	200					20,000	200
Total	1,108,190	39,294	36,378	2,016	21,559	1,499	1,380,761	53,060

STATEMENT, BY COUNTIES, OF THE YIELD OF THE POT FISHERIES OF NEW YORK IN 1904.

Species.	Kings.		Nassau.		New York.		Queens.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Eels	34,950	$2,850						
Lobsters	7,045	986	7,500	$975	47,108	$6,473		
Total	41,995	3,836	7,500	975	47,108	6,473		
Shore fisheries:								
Eels	41,510	3,538	72,670	5,523			30,350	$2,557
Crabs, hard	2,100	64						
Lobsters	24,520	1,760						
Total	68,130	5,362	72,670	5,523			30,350	2,557
Grand total	110,125	9,198	80,170	6,498	47,108	6,473	30,350	2,557

Species.	Richmond.		Suffolk.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Eels			7,000	$560			41,950	$3,410
Lobsters	22,500	$2,560	16,200	1,930			100,353	12,924
Total	22,500	2,560	23,200	2,490			142,303	16,334
Shore fisheries:								
Eels	3,000	270	248,095	17,181	14,800	$1,390	410,425	30,459
Tomcod					7,300	514	7,300	514
Crabs, hard	2,840	80					4,940	144
Lobsters	32,960	3,340	64,500	7,730	4,650	930	126,630	13,760
Total	38,800	3,690	312,595	24,911	26,750	2,834	549,295	44,877
Grand total	61,300	6,250	335,795	27,401	26,750	2,834	691,598	61,211

STATEMENT, BY COUNTIES, OF THE YIELD OF FISH BY SPEARS IN NEW YORK IN 1904.

Species.	Kings.		Nassau.		Queens.		Suffolk.		Westchester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:												
Eels	17,210	$1,791	47,700	$3,715	10,500	$940	90,260	$6,219	5,100	$537	170,770	$13,202
Flounders	3,400	170	4,950	198							8,350	368
Total	20,610	1,961	52,650	3,913	10,500	940	90,260	6,219	5,100	537	179,120	13,570

NOTES AND DETAILED STATISTICS OF PRINCIPAL FISHERIES.

Oyster.—The increase in the value of the products from $3,894,270 in 1901 to $6,230,558 in 1904 is due principally to the extension and success of oyster culture. In 1904, 2,847,702 bushels of market oysters were taken from the private areas and only 20,805 bushels from the natural reefs, a remarkable exhibition of the development of the cultivated grounds. As regards the value of the output, New York is now the foremost American state in oyster culture. The recent growth of this industry has been especially extensive at the eastern end of Long Island. Previous to 1900, oysters shipped from that region were planted elsewhere before marketing, but in recent years they have been permitted to remain until large enough for market. Of the market oysters credited to the private areas of the state, 378,410 bushels, worth $404,135, and of the seed oysters 46,150 bushels, worth $39,670, were taken up by vessels owned in Connecticut and elsewhere outside of New York.

Clam and scallop.—The quantity of clams and scallops produced in 1904 shows less change from that in 1901. The yield of hard clams on the public beds decreased from 175,536 bushels, worth $232,121, in 1901 to 119,637 bushels, worth $199,851, in 1904, but partial compensation for this is found in an increase on the private areas in the same period from 9,260 bushels, worth $25,565, to 47,365 bushels, worth $103,748. The cultivation of hard clams has made greater progress in this state than anywhere else in the United States. Little change occurred in the yield of soft clams, which amounted to 74,093 bushels in 1904, but there has been a steady increase in the market value. The price was 76 cents a bushel in 1901 and 88 cents in 1904. The yield of scallops decreased from 184,954 bushels in 1901 to 148,799 bushels in 1904, but the price increased from 53 cents to 98 cents a bushel. The scallop fishery is prosecuted principally in Peconic Bay, at the eastern end of Long Island, where the output has a much greater value than the combined yield of all other parts of the country.

Menhaden.—As regards the weight of products the menhaden is by far the most prominent of all species of fish credited to New York; the yield in 1904 amounted to 216,399,600 pounds. The total value of the large catch, however, was only $693,929. This fish is used almost entirely in the manufacture of oil and fertilizer.

The Menhaden Industry of New York in 1904.

Items.	No.	Value.
Factories	2	$400,600
Cash capital		180,000
Persons in factories	218	
Persons on vessels	797	
Menhaden received	184,208,000	362,162
Tons of dry scrap prepared	12,138	274,720
Gallons of oil made	1,155,539	237,149
Steam vessels fishing	[a] 33	413,100
Tonnage	2,866	
Outfit		141,423
Seines	66	33,900
Sail vessels fishing	3	6,300
Tonnage	74	
Outfit		2,295
Seines	3	1,150

[a] These vessels also supplied menhaden to factories in Rhode Island, Delaware, and Virginia.

Bluefish.—Of the food fish, the bluefish is the most important, the catch in 1904 amounting to 11,413,786 pounds, worth $556,527. In 1901 the yield of this species was 9,350,502 pounds, worth $473,-366. Most of the catch is taken by vessels sailing from Fulton Fish Market, New York City.

Squeteague.—The yield of squeteague, or weakfish, shows an increase from 2,346,683 pounds in 1901 to 6,339,600 pounds in 1904, which is the greatest percentage of increase among the prominent species. The squeteague were taken principally in the pound-net fisheries of Suffolk County, and by seines carried on the market fleet sailing from New York City. The yield by pound nets increased between 1901 and 1904 from 1,671,241 pounds to 3,730,690 pounds, and by vessels from 24,000 pounds to 1,761,375 pounds. This large increase in the vessel catch is due to the introduction of purse seines in that fishery, to which cause should also be credited the increase in the catch of scup from 804,589 pounds to 1,493,828 pounds.

Shad.—The shad fishery, prosecuted almost entirely in the Hudson River and the waters at its mouth, shows a remarkable falling off, the yield decreasing from 3,432,472 pounds in 1901 to 498,119 pounds in 1904. Nearly all other species of fish taken in those waters also show a considerable decrease in the yield. It should be noted that the shad returns for 1901 were unusually large, being greater than for any other year since 1888; but the normal catch for the Hudson in recent years has approximated 2,000,000 pounds, so that the yield in 1904 is only about 25 per cent of the average. The price received by the fishermen averaged nearly 30 cents per fish, whereas formerly it was less than half of that amount.

The Shad Catch of New York in 1904.

Counties.	No. of fish.	Value.
Albany	74	$29
Columbia	5,298	1,595
Dutchess	35,211	9,835
Greene	1,600	440
Kings	4,315	1,384
New York	710	260
Orange	5,461	1,538
Putnam	375	110
Rensselaer	428	135
Richmond	15,710	5,051
Rockland	7,699	2,434
Suffolk	3,171	1,235
Ulster	27,460	7,738
Westchester	17,018	5,042
Total	[a] 124,530	36,826

[a] 498,119 pounds.

Sturgeon.—The sturgeon fishery, which yielded $46,573 worth of products in 1898, has become almost extinct, the value of the output in 1904 amounting to only $1,010. The fishery for this species on the south side of Long Island, which originated in 1892, and which in 1898 employed 187 men and yielded $43,864, was not prosecuted in 1904, owing to its unprofitableness in the last few years.

WHOLESALE TRADE.

Number of Persons Employed and Capital Invested in the New York City Wholesale Fishery Trade in 1904.

Branches of trade.	No. of firms.	No. of persons.	Value of shore property.	Amount of cash capital.
Fresh-fish trade	55	638	$1,145,500	$952,500
Salted and prepared fish	44	574	1,040,700	995,000
Oyster and clam trade	31	488	269,950	435,500
Sponge trade	17	208	730,100	650,000
Miscellaneous	12	94	293,750	362,500
Total	159	2,002	3,480,000	3,395,500

FISHERIES OF NEW JERSEY.

GENERAL AND COMPARATIVE STATISTICS.

The excellent shipping facilities in the state and the proximity to the large markets of New York and Philadelphia give great importance to the fishing industries of New Jersey. Since 1901, however, owing to a falling off in the catch of oysters, clams, shad, and bluefish, New York and Virginia have superseded New Jersey in rank for value of fishery products, and the latter now stands third among the Middle Atlantic States.

The fisheries and wholesale trade in 1904 employed 9,094 persons. Of these 1,913 were on fishing vessels, 150 on transporting vessels,

6,230 in the shore or boat fisheries, and 801 in menhaden factories and other shore work. These figures represent a decrease since 1901 of 2,936 persons, or 24 per cent, apparent mainly in the shore and boat fisheries.

The total investment in the fisheries and wholesale trade in 1904 was $2,685,796, which is a decrease since 1901 of $43,775, or less than 2 per cent. Of this investment $232,050 represents the cash capital, $905,620 is credited to shore and accessory property, $693,441 represents the value of 366 fishing and 68 transporting vessels with their outfits, $441,989 the value of 5,172 boats under 5 tons, and the remainder, $412,696, the value of the apparatus used.

The total catch in 1904 was 90,108,068 pounds, valued at $3,385,415, a decrease since 1901 of 23 per cent in weight and 28 per cent in value. Of this 40,811,065 pounds, valued at $1,458,631, were taken in the vessel fisheries, and 49,297,003 pounds, valued at $1,926,784, in the shore fisheries. Except in Cumberland County, which has very valuable oyster fisheries, shad is the principal product of the region bordering Delaware River and Bay.

The following tables give in condensed form the number of persons employed, the amount of capital invested, and the quantity and value of the products of the fisheries of New Jersey in 1904:

NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF NEW JERSEY IN 1904.

How engaged.	No.
On vessels fishing	1,913
On vessels transporting	150
In shore or boat fisheries	6,230
Shoresmen	801
Total	9,094

INVESTMENT IN THE FISHERIES OF NEW JERSEY IN 1904.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	366	$495,025	Apparatus—shore fisheries:		
Tonnage	4,361		Seins	c 270	$23,708
Outfit		125,461	Gill nets	d 2,548	91,082
Vessels transporting	68	65,550	Pound nets	225	192,617
Tonnage	775		Bag nets	76	1,250
Outfit		7,405	Fyke nets	1,862	15,981
Boats, sail and row	4,467	219,239	Stop nets	e 56	5,992
Boats, gasoline	705	222,750	Lines, hand and trawl		4,165
Apparatus—vessel fisheries:			Eel pots	3,224	4,440
Seins	a 12	7,120	Lobster pots	731	913
Gill nets	b 64	1,314	Oyster tongs, rakes, and dredges	1,403	f 6,982
Fyke nets	100	250	Clam tongs, rakes, hoes, etc.	2,856	14,812
Lines, hand and trawl		1,140	Minor apparatus		1,158
Eel pots	55	55	Shore and accessory property		905,620
Lobster pots	580	580	Cash capital		232,050
Harpoons		35			
Crab and mussel dredges	132	658			
Oyster dredges	580	36,397	Total		2,685,796
Tongs and rakes	217	2,047			

a 5,130 yards in length.
b 5,765 yards in length.
c 48,476 yards in length.
d 564,170 yards in length.
e 40,270 yards in length.
f Includes value of patent winders.

PRODUCTS OF THE FISHERIES OF NEW JERSEY IN 1904.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Albacore	30,970	$450	Sheepshead	1,706	$213
Alewives, fresh	896,445	8,165	Skates	10,925	165
Alewives, salted	96,000	1,500	Smelt	8,780	1,599
Bluefish	2,728,390	120,085	Spanish mackerel	7,525	1,500
Bonito	597,501	24,499	Spot	35,900	1,560
Butterfish	1,357,080	39,631	Squeteague	10,699,301	253,200
Catfish	112,440	8,418	Striped bass	66,012	9,535
Cero	5,431	262	Sturgeon	227,520	12,622
Cod	1,261,855	53,789	Sturgeon caviar	8,432	7,115
Crevalle	1,420	30	Suckers	46,500	3,308
Croaker	342,341	7,066	Swordfish	8,000	580
Drum	226,110	1,452	Tautog	145,475	4,007
Eels, fresh	407,284	25,920	Tomcod	6,985	347
Eels, smoked	325	80	Whiting, or silver hake	676,595	11,515
Flounders	1,052,239	37,563	Other fish	660	14
German carp	468,300	35,373	Clams, hard	[a]2,165,888	351,758
Haddock	140,600	6,318	Clams, soft	[b]973,150	70,450
Hake	389,850	10,550	Clams, surf	[c]67,200	6,000
Hickory shad	14,270	310	Crabs, hard	[d]224,499	8,658
Horse mackerel	12,805	187	Crabs, soft	[e]125,567	19,600
Kingfish	20,826	2,587	King crabs	[f]1,638,000	6,518
Mackerel	113,743	7,445	Lobsters	141,340	18,269
Menhaden	37,609,805	109,090	Mussels	[g]1,392,750	2,115
Mullet, fresh	54,000	2,050	Oysters, market, natural rock	[h]234,220	24,305
Mullet, salted	3,000	45			
Perch, white	253,350	19,620	Oysters, market, private beds	[i]8,930,054	1,274,203
Perch, yellow	600	35			
Pike and pickerel	600	55	Oysters, seed, natural rock	[j]5,772,515	392,925
Pollock	10,234	246	Oysters, seed, private beds	[k]9,100	520
Round herring	132,250	2,061	Porpoise	500	2
Salmon, Atlantic	36	18	Shrimp	4,949	1,425
Scup	1,054,682	32,067	Squid	80,909	2,064
Sea bass	2,572,046	97,903	Terrapin	4,700	4,450
Sea robbins	37,200	348	Turtles	34,901	727
Shad	4,337,907	238,517			
Sharks	20,575	411	Total	90,108,068	3,385,415

[a] 270,736 bushels.
[b] 97,315 bushels.
[c] 8,400 bushels.
[d] 673,497 in number.
[e] 376,701 in number.
[f] 819,000 in number.
[g] 30,215 bushels.
[h] 33,460 bushels.
[i] 1,275,722 bushels.
[j] 824,645 bushels.
[k] 1,300 bushels.

NOTE.—Under sharks, above, is included 11,300 pounds of dogfish, valued at $147.

THE FISHERIES BY COUNTIES.

Cumberland County ranks first among the counties of this state in the value of its fisheries, which in 1904 amounted to $1,090,157. The oyster fishery, centering at Maurice River Cove, and the gill-net fishery for shad are the most important branches.

Monmouth County owes its position of second place to its important pound-net fisheries, which exceed in value those of any other county in the United States except Whatcom County, Wash. Its hard and soft clam fisheries also contribute largely to its output. The oyster fisheries are valuable, but their decline in recent years has been very marked.

Ocean County is third in importance. It outranks Monmouth in the value of its oyster fisheries, but its clam fisheries, though very valuable, are far less so than those in Monmouth County. The difference is especially noticeable in the soft clam industry, which is prosecuted at only one town in Ocean County. This county has important pound-net and fyke-net fisheries, the latter apparatus being set mainly for flounders.

Except an unimportant gill-net fishery for shad and alewives, the fisheries of Camden County are directed entirely to oysters, which are not taken in the waters of the county, but in Maurice River Cove by vessels owned in Camden.

Atlantic County has valuable oyster and clam fisheries. The oysters are taken chiefly from private beds within the waters of the county, but a few vessels also work in Maurice River Cove. The clam fishery gives employment to more men than any other fishery. The net and line fisheries center at Atlantic City, though there are some quite important net fisheries on the Great Egg Harbor River. Important seine fisheries are prosecuted back of Atlantic City in what is known as the "Thoroughfare," but most of the hand-line and all of the trawl-line fishing is carried on in the ocean. Notwithstanding its important fisheries, Atlantic City received very heavy shipments of fish from Seabright and other northern points during the summer season.

About half of the value of the catch in Cape May County is credited to lines. This county also has quite important pound-net and seine fisheries. The remainder of the catch consists mostly of oysters from private beds, and clams.

Salem County leads all others in the yield of shad, which are taken in the Delaware River with drift gill nets. This county also leads in the catch of carp and sturgeon. Comparatively few other species are taken in any considerable quantities.

Middlesex County depends mainly upon its oyster and clam fisheries, both of which have been declining during recent years. A few smelt are taken in the Raritan River at New Brunswick during the spring.

Aside from the catch of oysters, clams, and shad, the fisheries of Burlington County are not very important. The catch of white perch and striped bass has been quite large, but recently there has been a very marked falling off, especially in striped bass.

Practically the entire catch of Gloucester County consists of shad and carp. This county ranks second, or next to Salem County, in the catch of these two species.

Hudson County ranks second to Monmouth County in the value of its lobster catch. A few oysters are taken in New York Bay off Jersey City, and shad are taken in New York Bay and the Hudson and Hackensack rivers. The remainder of the catch consists chiefly of carp.

The catch in Bergen County consists of shad, carp, catfish, eels, suckers, striped bass, and smelt, in the order of their importance. The fishing is done in the Hudson and Hackensack rivers, the shad being taken mostly in the former and the other species in the latter. About two-thirds of the shad catch in the Hudson is taken by men

from Monmouth and Ocean counties, who move up on the Hudson River during the shad season.

With the exception of Union County, which has an oyster fishery at Elizabethport, the remaining counties of the state depend almost entirely for their products upon shad taken in the Delaware River. Essex County has no fisheries, but supports a wholesale fish trade at Newark.

The following tables give the extent of the fisheries by counties:

STATEMENT, BY COUNTIES, OF THE NUMBER OF PERSONS ENGAGED IN THE FISHERIES OF NEW JERSEY IN 1904.

Counties.	On vessels fishing.	On vessels transporting.	In shore or boat fisheries.	Shoresmen.	Total.
Atlantic	122	18	699	28	867
Bergen			105	2	107
Burlington		8	368	6	382
Camden	169	3	6	20	198
Cape May	41	10	459	6	516
Cumberland	1,253	13	438	230	1,934
Essex				24	24
Gloucester			221	14	235
Hudson	7		150	14	171
Hunterdon			41		41
Mercer			76		76
Middlesex	18	9	194	2	223
Monmouth	151	68	1,596	279	2,094
Ocean	152	21	1,135	176	1,484
Salem			648		648
Sussex			4		4
Union			52		52
Warren			38		38
Total	1,913	150	6,230	801	9,094

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, SHORE PROPERTY, AND CASH CAPITAL EMPLOYED IN THE FISHERIES OF NEW JERSEY IN 1904.

Items.	Atlantic.		Bergen.		Burlington.		Camden.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	37	$29,800					23	$63,650
Tonnage	285						358	
Outfit		8,830						9,175
Vessels transporting	11	5,900			4	$4,250	1	1,400
Tonnage	84				44		10	
Outfit		790				495		170
Boats, sail and row	854	39,157	62	$2,585	267	19,450	2	100
Boats, gasoline	16	5,075	7	1,875	9	2,690	1	300
Apparatus—vessel fisheries:								
Lines, hand and trawl		810						
Oyster dredges	10	520					46	3,837
Tongs and rakes	50	267						
Apparatus—shore fisheries:								
Seines	39	1,350	4	690	16	3,278		
Gill nets	61	300	46	9,650	99	3,234	4	180
Pound nets	7	9,300						
Bag nets	20	600			56	650		
Fyke nets					97	123		
Stop nets			9	772	3	350		
Lines, hand and trawl		551				1		
Eel pots	125	125	200	700				
Oyster tongs, rakes, and dredges	234	1,170			60	300		
Clam tongs, rakes, hoes, etc	642	3,008			84	456		
Minor apparatus		54		450				
Shore and accessory property		158,125		11,775		4,805		23,500
Cash capital		20,000						12,000
Total		285,732		28,497		40,082		114,312

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, SHORE PROPERTY, AND CASH CAPITAL EMPLOYED IN THE FISHERIES OF NEW JERSEY IN 1904—Con.

Items.	Cape May.		Cumberland.		Essex.		Gloucester.		Hudson.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	6	$20,000	231	$238,725					3	$1,700
Tonnage	81		2,628						23	
Outfit		13,955		58,691						855
Vessels transporting	2	2,550	4	3,200						
Tonnage	15		95							
Outfit		340		730						
Boats, sail and row	269	5,361	245	13,092			72	$4,935	82	3,950
Boats, gasoline	66	18,925	73	22,300			53	19,850	5	1,350
Apparatus—vessel fisheries:										
Seines	1	400	1	500						
Gill nets	5	200								
Lines, hand and trawl		330								
Eel pots									55	55
Lobster pots									290	290
Oyster dredges			460	31,367						
Apparatus—shore fisheries:										
Seines	16	480	7	155			3	4,300		
Gill nets	68	3,015	118	13,916			56	7,255	3	675
Pound nets	122	19,277								
Fyke nets	32	612	203	188					193	4,115
Stop nets			7	805			12	2,360	9	545
Lines, hand and trawl		280		11						
Eel pots	40	40	28	30					34	65
Lobster pots									100	100
Oyster tongs, rakes, and dredges	77	130	218	1,491					110	550
Clam tongs, rakes, hoes, etc	241	1,260	3	1						
Minor apparatus		15						56		
Shore and accessory property		26,525		122,055		$27,200		9,150		26,105
Cash capital		10,000		100,400		11,000				25,000
Total		123,695		607,657		38,200		47,906		65,355

Items.	Hunterdon.		Mercer.		Middlesex.		Monmouth.		Ocean.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing					9	$4,350	50	$35,800	7	$101,000
Tonnage					66		554		366	
Outfit						1,525		9,590		22,840
Vessels transporting					2	4,200	33	33,950	11	10,100
Tonnage					48		365		114	
Outfit						410		3,450		1,020
Boats, sail and row	8	$330	28	$915	119	7,050	918	35,885	1,147	65,515
Boats, gasoline					12	3,800	256	79,835	26	6,800
Apparatus—vessel fisheries:										
Seines							5	2,220	5	4,000
Gill nets							59	1,114		
Fyke nets							100	250		
Lobster pots							290	290		
Harpoons								35		
Crab and mussel dredges							132	658		
Oyster dredges							62	638	2	35
Tongs and rakes					36	405	130	1,370	1	5
Apparatus—shore fisheries:										
Seines	7	810	7	1,955	16	1,945	50	3,030	75	3,838
Gill nets			16	352			610	8,370	1,161	8,770
Pound nets							85	143,480	11	20,560
Fyke nets					14	380	367	4,540	956	6,023
Lines, hand and trawl								2,662		658
Eel pots					111	111	1,152	1,844	1,340	1,320
Lobster pots					17	30	600	755	14	28
Oyster tongs, rakes, and dredges					119	415	84	421	401	2,005
Clam tongs, rakes, hoes, etc					36	253	1,054	5,062	796	4,772
Minor apparatus								252		236
Shore and accessory property				5,000		1,170		313,485		175,475
Cash capital								27,650		26,000
Total		1,140		8,222		26,044		716,636		461,000

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, SHORE PROPERTY, AND CASH CAPITAL EMPLOYED IN THE FISHERIES OF NEW JERSEY IN 1904—Con.

Items.	Salem.		Sussex.		Union.		Warren.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing									366	$495,025
Tonnage									4,361	
Outfit										125,461
Vessels transporting									68	65,550
Tonnage									775	
Outfit										7,405
Boats, sail and row	361	$18,928	1	$10	25	$1,875	7	$101	4,467	219,239
Boats, gasoline	180	59,750			1	200			705	222,750
Apparatus—vessel fisheries:										
Seines									a 12	7,120
Gill nets									b 64	1,314
Fyke nets									100	250
Lines, hand and trawl										1,140
Eel pots									55	55
Lobster pots									580	580
Harpoons										35
Crab and mussel dredges									132	658
Oyster dredges									580	36,397
Tongs and rakes									217	2,047
Apparatus—shore fisheries:										
Seines	22	1,675	1	12			7	190	c 270	23,708
Gill nets	305	35,365							d 2,548	91,082
Pound nets									225	192,617
Bag nets									76	1,250
Fyke nets									1,862	15,981
Stop nets	16	1,160							e 56	5,992
Lines, hand and trawl		2								4,165
Eel pots	194	205							3,224	4,440
Lobster pots									731	913
Oyster tongs, rakes, and dredges					100	500			1,403	f 6,982
Clam tongs, rakes, hoes, etc									2,856	14,812
Minor apparatus		95								1,158
Shore and accessory property		1,250								905,620
Cash capital										232,050
Total		118,430		22		2,575		291		2,685,796

a 5,130 yards in length.
b 5,765 yards in length.
c 48,476 yards in length.
d 564,170 yards in length.
e 40,270 yards in length.
f Includes value of patent winders.

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF NEW JERSEY IN 1904.

Species.	Atlantic.		Bergen.		Burlington.		Camden.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore	2,500	$30						
Alewives, fresh	18,200	241			160,000	$425	8,000	$100
Alewives, salted					96,000	1,500		
Bluefish	44,775	2,535						
Bonito	3,025	183						
Butterfish	13,500	500						
Carp, German			57,500	$5,790	27,600	1,960		
Catfish	400	20	42,850	4,260	21,150	1,581		
Cero	225	22						
Cod	623,400	23,860						
Crevalle	100	2						
Croaker	72,700	1,520						
Eels, fresh	27,550	1,350	42,000	2,800				
Flounders	55,925	2,720			2,600	100		
Haddock	70,900	2,975						
Hake	11,250	315						
Hickory shad	100	2						
Kingfish	10,265	565						
Mackerel	3,000	375						
Perch, white	34,350	1,905			35,200	2,300		
Pike and pickerel	250	25			50	5		
Pollock	350	7						
Round herring	5,625	63						
Salmon, Atlantic					12	3		
Scup	119,300	3,840						
Sea bass	143,800	7,425						
Sea robins	100	3						
Shad	6,080	710	201,800	17,758	341,800	18,463	14,400	980
Sheepshead	1,425	160						
Skates	300	9						
Smelt			1,500	270				
Spanish mackerel	700	100						
Spot	2,000	105						
Squeteague	610,100	20,495			20,200	630		
Striped bass	1,810	340	7,800	780	8,890	938		
Sturgeon	2,000	105			300	38		
Caviar and sturgeon eggs	100	70						
Suckers	1,400	55	16,100	1,588	8,800	626		
Tautog	2,000	90						
Whiting	1,000	12						
Other fish	100	2						
Clams, hard	438,248	75,002			75,200	12,500		
Clams, surf	64,800	5,900						
Crabs, hard	41,000	1,340						
Crabs, soft	1,500	300						
Mussels	1,368,050	1,415						
Oysters, market, private beds	478,275	66,225			143,500	17,125	1,446,984	206,712
Oysters, seed, natural rock	140,420	8,395			28,000	1,500	563,500	42,175
Oysters, seed, private beds	7,000	400						
Shrimp	3,712	700						
Squid	1,000	13						
Terrapin	3,000	3,300						
Turtles	300	5						
Total	4,437,910	235,731	369,550	33,246	969,302	59,694	2,032,884	249,967

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF NEW JERSEY IN 1904—Continued.

Species.	Cape May.		Cumberland.		Gloucester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore	3,000	$60				
Alewives, fresh	17,500	162	30,800	$194	20,000	$100
Bluefish	316,200	21,265				
Bonito	3,500	175				
Butterfish	232,200	2,780				
Carp, German			62,700	4,592	105,500	8,440
Catfish	150	6	19,000	1,310		
Cero	500	25				
Cod	451,800	22,576				
Croaker	14,000	465				
Drum	11,550	76				
Eels, fresh	69,800	6,153	4,000	294		
Flounders	88,200	3,000	100	4		
Haddock	56,600	2,830				
Hake	148,300	7,244				
Kingfish	4,000	958				
Mackerel	34,000	3,140				
Menhaden	588,000	3,592	3,124,830	6,500		
Mullet, fresh	27,000	1,350				
Mullet, salted	3,000	45				
Perch, white	2,500	125	2,850	177		
Perch, yellow	500	25				
Pike and pickerel			100	5		
Scup	310,500	10,790				
Sea bass	852,800	41,940	100,000	4,000		
Shad	6,700	469	410,369	20,499	902,400	45,448
Sheepshead	200	36				
Skates	6,000	120				
Smelt	700	182				
Spot	24,500	1,240				
Squeteague	857,200	11,785	12,500	500		
Striped bass	2,850	345	3,850	435	200	20
Sturgeon	7,140	684	45,185	3,116		
Caviar and sturgeon eggs	300	255	2,271	1,957		
Suckers			800	43		
Tautog	200	6				
Whiting	3,200	94				
Clams, hard	214,016	27,930	3,072	384		
Crabs, hard	600	75				
King crabs	1,624,000	6,443				
Oysters, market, private beds	135,450	23,850	5,203,184	743,312		
Oysters, seed, natural rock	12,950	620	4,589,200	302,835		
Squid	35,500	1,165				
Terrapin	1,700	1,150				
Turtles	4,100	78				
Total	6,172,906	205,309	13,614,811	1,090,157	1,028,100	54,008

Species.	Hudson.		Hunterdon.		Mercer.		Middlesex.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	800	$20			80,000	$1,250	28,700	$306
Bluefish							8,000	232
Carp, German	19,700	2,000			700	41	600	60
Catfish	1,000	100			400	4	3,940	185
Eels, fresh	11,000	745					6,970	606
Flounders							1,800	94
Menhaden							83,000	162
Perch, white					5,000	200	650	55
Perch, yellow							100	10
Salmon, Atlantic	24	15						
Shad	69,200	8,860	37,000	$2,865	171,120	11,555	11,150	1,077
Smelt							4,900	980
Squeteague							46,200	1,582
Striped bass					500	50	2,100	229
Sturgeon	700	51						
Caviar and sturgeon eggs	60	39						
Suckers							900	100
Tomcod							4,650	237
Clams, hard							78,552	12,850
Clams, soft							3,750	900
Lobsters	75,000	7,895					800	120
Oysters, market, natural rock	87,500	7,500						
Oysters, market, private beds							252,000	35,840
Oysters, seed, natural rock	150,500	12,800					140,000	13,500
Total	415,484	40,025	37,000	2,865	257,720	13,100	678,762	69,125

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF NEW JERSEY IN 1904—Continued.

Species.	Monmouth.		Ocean.		Salem.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore	13,895	$210	11,575	$150		
Alewives, fresh	247,645	2,724	278,800	2,523	6,000	$120
Bluefish	2,248,805	90,685	105,610	5,368		
Bonito	486,626	19,992	104,350	4,149		
Butterfish	677,980	23,411	433,400	12,940		
Carp, German					193,000	12,440
Catfish			2,750	110	20,800	842
Cero	2,031	100	2,675	115		
Cod	141,555	5,763	45,100	1,590		
Crevalle	920	18	400	10		
Croaker	158,341	3,831	97,300	1,250		
Dogfish	11,300	147				
Drum	202,560	1,337	12,000	39		
Eels, fresh	140,584	8,477	94,380	4,805	11,000	690
Eels, smoked	325	80				
Flounders	527,799	16,907	375,815	14,738		
Haddock	7,720	303	5,380	210		
Hake	197,400	2,432	32,900	559		
Hickory shad	9,770	230	4,400	78		
Horse mackerel	5,855	87	6,950	100		
Kingfish	5,401	877	1,160	187		
Mackerel	75,628	3,852	1,115	78		
Menhaden	18,488,425	60,366	15,325,550	38,470		
Mullet, fresh	21,000	585	6,000	115		
Perch, white	2,800	229	168,000	14,469	2,000	160
Pike and pickerel			200	20		
Pollock	7,784	196	2,100	43		
Round herring	125,125	1,953	1,500	45		
Scup	442,382	11,722	182,500	5,715		
Sea bass	1,085,446	30,913	390,000	13,625		
Sea robins	31,000	225	6,100	120		
Shad	94,500	8,591	6,470	595	2,053,248	99,712
Sharks	9,275	264				
Sheepshead	72	15	9	2		
Skates	2,125	16	2,500	20		
Smelt	1,650	162	30	5		
Spanish mackerel	6,050	1,235	775	165		
Spot	7,600	170	1,800	45		
Squeteague	7,423,751	177,107	1,723,350	40,621	6,000	480
Striped bass	12,735	2,160	12,077	2,593	13,200	1,645
Sturgeon	11,695	865	1,900	103	158,600	7,660
Caviar and sturgeon eggs	1,226	1,006	75	48	4,400	3,740
Suckers	14,700	580	1,200	60		
Swordfish	8,000	580				
Tautog	142,700	3,900	575	11		
Tomcod	2,000	100	335	10		
Whiting	588,270	9,868	84,125	1,541		
Other fish	560	12				
Clams, hard	847,600	143,735	509,200	79,357		
Clams, soft	958,700	67,950	10,700	1,600		
Clams, surf	2,400	100				
Crabs, hard	178,866	7,110	4,033	133		
Crabs, soft	101,834	15,800	22,233	3,500		
King crabs	14,000	75				
Lobsters	65,240	10,214	300	40		
Mussels	24,700	700				
Oysters, market, natural rock	30,975	3,520	115,745	13,285		
Oysters, market, private beds	434,924	64,638	835,737	116,501		
Oysters, seed, natural rock	24,500	1,700	56,945	3,150		
Oysters, seed, private beds			2,100	120		
Shrimp			1,237	725		
Porpoise			500	2		
Squid	32,709	682	11,700	204		
Turtles	28,201	593	2,300	51		
Total	36,437,660	811,100	21,105,961	386,108	2,468,248	127,489

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF NEW JERSEY IN 1904—Continued.

Species.	Sussex.		Union.		Warren.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Albacore							30,970	$450
Alewives, fresh							896,445	8,165
Alewives, salted							96,000	1,500
Bluefish							2,723,390	120,085
Bonito							597,501	24,499
Butterfish							1,357,080	39,631
Carp, German					1,000	$50	468,300	35,373
Catfish							112,440	8,418
Cero							5,431	262
Cod							1,261,855	53,789
Crevalle							1,420	30
Croaker							342,341	7,066
Dogfish							11,300	147
Drum							226,110	1,452
Eels, fresh							407,284	25,920
Eels, smoked							325	80
Flounders							1,052,239	37,563
Haddock							140,600	6,318
Hake							389,850	10,550
Hickory shad							14,270	310
Horse mackerel							12,805	187
Kingfish							20,826	2,587
Mackerel							113,743	7,445
Menhaden							37,609,805	109,090
Mullet, fresh							54,000	2,050
Mullet, salted							3,000	45
Perch, white							253,350	19,620
Perch, yellow							600	35
Pike and pickerel							600	55
Pollock							10,234	246
Round herring							132,250	2,061
Salmon, Atlantic							36	18
Scup							1,054,682	32,067
Sea bass							2,572,046	97,903
Sea robins							37,200	348
Shad	450	$25			11,220	910	4,337,907	238,517
Sharks							9,275	264
Sheepshead							1,706	213
Skates							10,925	165
Smelt							8,780	1,599
Spanish mackerel							7,525	1,500
Spot							35,900	1,560
Squeteague							10,699,301	253,200
Striped bass							66,012	9,535
Sturgeon							227,520	12,622
Caviar and sturgeon eggs							8,432	7,115
Suckers					2,600	256	46,500	3,308
Swordfish							8,000	580
Tautog							145,475	4,007
Tomcod							6,985	347
Whiting							676,595	11,515
Other fish							660	14
Clams, hard							[a] 2,165,888	351,758
Clams, soft							[b] 973,150	70,450
Clams, surf							[c] 67,200	6,000
Crabs, hard							[d] 224,499	8,658
Crabs, soft							[e] 125,567	19,600
King crabs							[f] 1,638,000	6,518
Lobsters							141,340	18,269
Mussels							[g] 1,392,750	2,115
Oysters, market, natural rock							[h] 234,220	24,305
Oysters, market, private beds							[i] 8,930,054	1,274,203
Oysters, seed, natural rock			66,500	$6,250			[j] 5,772,515	392,925
Oysters, seed, private beds							[k] 9,100	520
Porpoise							500	2
Shrimp							4,949	1,425
Squid							80,909	2,064
Terrapin							4,700	4,450
Turtles							34,901	727
Total	450	25	66,500	6,250	14,820	1,216	90,108,068	3,385,415

[a] 270,736 bushels.
[b] 97,315 bushels.
[c] 8,400 bushels.
[d] 673,497 in number.
[e] 376,701 in number.
[f] 819,000 in number.
[g] 30,215 bushels.
[h] 33,460 bushels.
[i] 1,275,722 bushels.
[j] 824,645 bushels.
[k] 1,300 bushels.

THE PRODUCTS BY APPARATUS.

Dredges, tongs, rakes, etc.—The most productive forms of apparatus employed in the fisheries of New Jersey, as determined by the value of the catch, are dredges, tongs, rakes, etc., used in the capture of oysters, clams, mussels, and crabs, the yield being 19,657,210 pounds, valued at $2,126,576.

Pound nets.—Next in importance were pound nets, the catch amounting to 26,850,091 pounds of fish of various species, valued at $421,691. Nets are set along the entire coast of New Jersey, but are most numerous off Monmouth County. The few in Delaware Bay are fished mostly for king crabs and squeteague, a separate crib being added for the latter species. Port Monmouth, in Monmouth County, is the most important pound-net center, being within convenient reach of New York City, the market for all of the catch except menhaden. Menhaden, however, constitute more than half of the pound-net and fyke-net catch at this place. They are sold chiefly to hand-line fishermen at Seabright and vicinity, for bait.

There are several large cold-storage plants on this coast, some of them with a capacity of three-quarters of a million pounds, and valued at $30,000 to $40,000. These plants are the result of a demand for means of retaining the catch until the prevalence of higher prices than those obtainable during the season. They are in some cases owned by the fishermen, in others by stock companies.

Lines.—The line catch in 1904 amounted to 6,735,630 pounds, valued at $287,461. The most important line fisheries are located at Seabright and Galilee, in Monmouth County, Atlantic City, in Atlantic County, and Holly Beach and Anglesea, in Cape May County. At Seabright and Galilee bluefish is the most important species taken. At Atlantic City there is a trawl-line fishery for cod and a hand-line fishery during the summer for squeteague, sea bass, bluefish, flounders, and other species. At Holly Beach and Anglesea hand lining, especially for sea bass, is much more important than trawl-line fishing. The line fisheries of Ocean County are important in the aggregate, but there is no distinctive center, as in Monmouth, Cape May, and Atlantic counties.

Gill nets.—The yield of this apparatus was 5,271,711 pounds, valued at $245,470. Gill nets are used mainly in the Delaware and Hudson rivers, shad being by far the most important species taken. The sturgeon gill-net fishery in the Delaware River is also important, though it has declined very noticeably during recent years. Salem County supports the most important gill-net fisheries in the state, shad constituting nine-tenths of the value of the catch, and the remainder being sturgeon with the resulting caviar. Some of the shad gill nets are more than 1,200 yards in length. In some localities

gill nets are used in the ocean for taking bluefish and squeteague, and gill netting for mackerel assumes some importance during the spring. In past years large catches of white perch and striped bass have been made with gill nets in Barnegat Bay, but the catch in 1904 was very light, and a decline has been noticeable for several years. In Cape May County gill nets are employed in taking menhaden, which are used as bait on hand lines.

Seines.—The most important species taken in seines are menhaden, shad, squeteague, white perch, and striped bass. The seine catch for Ocean and Monmouth counties far exceeds in value that of all the other counties combined, a fact due to the large catch of menhaden for fertilizer factories located near Tuckerton, in Ocean County, and at Port Monmouth, in Monmouth County. Seines are used under the ice in Barnegat Bay for white perch and striped bass. Profitable catches have been made in the past, but the decrease in the abundance of these two species has had a depressing effect upon the fishery. The catch in 1904 was 29,969,443 pounds, valued at $176,551.

Eel and lobster pots took 371,545 pounds, valued at $31,454; fyke nets, 535,998 pounds, valued at $31,130; stop nets, 369,300 pounds, valued at $29,352; and bag nets and other forms of apparatus, 347,140 pounds, valued at $35,730.

The following tables give in detail the quantity and value of products taken in the vessel and shore fisheries by each form of apparatus:

Statement, by Counties, of the Catch by Dredges, Tongs, Rakes, etc., in New Jersey in 1904.

Species.	Atlantic.		Burlington.		Camden.		Cape May.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Clams, hard	33,600	$5,710						
Clams, surf	4,800	400						
Mussels	570,000	450						
Oysters, market, private beds					1,446,984	$206,712		
Oysters, seed, natural rock	42,210	2,695			563,500	42,175		
Total	650,610	9,255			2,010,484	248,887		
Shore fisheries:								
Clams, hard	404,648	69,292	75,200	$12,500			214,016	$27,930
Clams, surf	60,000	5,500						
Mussels	798,050	965						
Oysters, market, private beds	478,275	66,225	143,500	17,125			135,450	23,850
Oysters, seed, natural rock	98,210	5,700	28,000	1,500			12,950	620
Oysters, seed, private beds	7,000	400						
Total	1,846,183	148,082	246,700	31,125			362,416	52,400
Grand total	2,496,793	157,337	246,700	31,125	2,010,484	248,887	362,416	52,400

STATEMENT, BY COUNTIES, OF THE CATCH BY DREDGES, TONGS, RAKES, ETC., IN NEW JERSEY IN 1904—Continued.

Species.	Cumberland.		Hudson.		Middlesex.		Monmouth.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Clams, hard					51,800	$8,200	111,360	$17,960
Clams, surf							2,400	100
Crabs, hard							112,333	4,300
Mussels							24,700	700
Oysters, market, natural rock							30,975	3,520
Oysters, market, private beds	5,126,184	$732,312					84,000	11,320
Oysters, seed, natural rock	3,403,400	240,925					3,500	200
Total	8,529,584	973,237			51,800	8,200	369,268	38,100
Shore fisheries:								
Clams, hard	3,072	384			26,752	4,650	736,240	125,775
Clams, soft					3,750	900	958,700	67,950
Oysters, market, natural rock			87,500	$7,500				
Oysters, market, private beds	77,000	11,000			252,000	35,840	350,924	53,318
Oysters, seed, natural rock	1,185,800	61,910	150,500	12,800	140,000	13,500	21,000	1,500
Total	1,265,872	73,294	238,000	20,300	422,502	54,890	2,066,864	248,543
Grand total	9,795,456	1,046,531	238,000	20,300	474,302	63,090	2,436,132	286,643

Species.	Ocean.		Union.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Clams, hard					196,760	$31,870
Clams, surf					7,200	500
Crabs, hard					112,333	4,300
Mussels					594,700	1,150
Oysters, market, natural rock	70	$10			31,045	3,530
Oysters, market, private beds	6,069	867			6,663,237	951,211
Oysters, seed, natural rock	12,600	900			4,025,210	286,895
Total	18,739	1,777			11,630,485	1,279,456
Shore fisheries:						
Clams, hard	509,200	79,357			1,969,128	319,888
Clams, soft	10,700	1,600			973,150	70,450
Clams, surf					60,000	5,500
Mussels					798,050	965
Oysters, market, natural rock	115,675	13,275			203,175	20,775
Oysters, market, private beds	829,668	115,634			2,266,817	322,992
Oysters, seed, natural rock	44,345	2,250	66,500	$6,250	1,747,305	106,030
Oysters, seed, private beds	2,100	120			9,100	520
Total	1,511,688	212,236	66,500	6,250	8,026,725	847,120
Grand total	1,530,427	214,013	66,500	6,250	19,657,210	2,126,576

STATEMENT, BY COUNTIES, OF THE YIELD OF THE POUND-NET FISHERIES OF NEW JERSEY IN 1904.

Species.	Atlantic.		Cape May.		Monmouth.		Ocean.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Albacore	2,500	$30	3,000	$60	13,895	$210	11,575	$150	30,970	$450
Alewives	1,800	16	17,500	162	241,145	2,617	12,800	58	273,245	2,853
Bluefish	1,400	110	1,700	105	71,605	3,499	12,750	603	87,455	4,317
Bonito	600	28	3,500	175	338,151	14,266	98,300	3,904	440,551	18,373
Butterfish	13,500	500	232,000	2,770	677,080	23,379	431,700	12,890	1,354,280	39,539
Catfish			150	6					150	6
Cero	225	22	500	25	2,031	100	2,675	115	5,431	262
Cod	1,400	40	400	16	35,755	1,178	12,600	400	50,155	1,634
Crevalle	100	2			920	18	400	10	1,420	30
Croaker	24,000	300	11,000	315	150,041	3,669	96,200	1,225	281,241	5,509
Dogfish					11,000	123			11,000	123
Drum			11,550	76	202,460	1,336	12,000	39	226,010	1,451
Eels			1,200	80	3,549	143	230	5	4,979	228
Flounders	7,000	270	53,000	1,849	289,799	9,144	62,400	1,930	412,199	13,193
Haddock					1,220	43			1,220	43
Hake			700	14	180,200	2,077	27,700	359	208,600	2,450
Hickory shad	100	2			9,720	228	4,400	78	14,220	308
Horse mackerel					5,855	87	6,950	100	12,805	187
Kingfish	500	50	2,600	696	5,307	853	1,160	187	9,567	1,786
Mackerel	3,000	375	10,000	1,240	18	2	1,115	78	14,133	1,695
Menhaden			70,000	220	9,550,425	32,479	30,950	210	9,651,375	32,909
Perch, yellow			500	25					500	25
Pollock	100	2			7,784	196	2,100	43	9,984	241
Round herring	5,625	63			117,125	1,863	1,500	45	124,250	1,971
Scup	85,000	2,400	25,000	850	419,782	11,137	172,700	5,345	702,482	19,732
Sea bass	9,000	525	800	40	810,746	22,035	220,400	5,600	1,040,946	28,200
Sea robins	100	3			31,000	225	6,100	120	37,200	348
Shad	6,000	700	6,700	469	65,750	6,081	6,470	595	84,920	7,845
Sharks					9,100	262			9,100	262
Sheepshead	750	60	200	36	72	15	9	2	1,031	113
Skates	300	9	6,000	120	2,125	16	2,500	20	10,925	165
Spanish mackerel	700	100	700	182	6,050	1,235	775	165	8,225	1,682
Spot			4,500	240	3,600	90	1,800	45	9,900	375
Squeteague	275,000	4,500	576,200	6,725	7,020,301	167,196	1,446,500	31,450	9,318,001	209,871
Striped bass			250	27					250	27
Sturgeon	2,000	105	7,140	684	11,695	865	1,900	103	22,735	1,757
Caviar and sturgeon eggs	100	70	300	255	1,226	1,006	75	48	1,701	1,379
Tautog			200	6	1,950	28	575	11	2,725	45
Whiting	1,000	12	3,200	94	530,770	8,753	84,125	1,541	619,095	10,400
Other fish					560	12			560	12
Crabs, hard					12,000	435	800	8	12,800	443
King crabs			1,624,000	6,443					1,624,000	6,443
Lobsters					1,420	212	25	4	1,445	216
Porpoise							500	2	500	2
Squid	1,000	13	35,500	1,165	32,709	682	11,700	204	80,909	2,064
Turtles	300	5	4,100	78	28,201	593	2,300	51	34,901	727
Total	443,100	10,312	2,714,090	25,248	20,904,142	318,388	2,788,759	67,743	26,850,091	421,691

STATEMENT, BY COUNTIES, OF THE YIELD OF THE LINE FISHERIES OF NEW JERSEY IN 1904.

Species.	Atlantic.		Burlington.		Cape May.		Cumberland.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Bluefish	26,300	$1,400			156,000	$10,220		
Bonito	425	15						
Cod	502,000	19,220			346,400	17,320		
Croaker	23,700	620						
Flounders	10,550	480			3,400	102		
Haddock	53,400	2,275			52,000	2,600		
Hake	9,350	260			6,200	186		
Kingfish	65	5						
Pollock	250	5						
Scup	10,300	340			34,500	1,320		
Sea bass	107,000	5,240			365,000	18,250	100,000	$4,000
Squeteague	7,800	240						
Total	751,140	30,100			963,500	49,998	100,000	4,000
Shore fisheries:								
Bluefish	16,300	970			153,500	10,790		
Bonito	2,000	140						
Cod	120,000	4,600			105,000	5,240		
Croaker	25,000	600			3,000	150		
Eels	350	20						
Flounders	28,400	1,410			27,100	904		
Haddock	17,500	700			4,600	230		
Hake	1,900	55			141,400	7,044		
Kingfish	3,300	180			1,000	230		
Perch, white			600	$20				
Scup	24,000	1,100			71,000	2,770		
Sea bass	26,800	1,580			482,000	23,500		
Sheepshead	675	100						
Spot	1,200	40						
Squeteague	203,800	8,690	8,200	285	20,500	685	9,000	360
Tautog	1,500	60						
Crabs, hard					600	75		
Total	472,725	20,245	8,800	305	1,009,700	51,618	9,000	360
Grand total	1,223,865	50,345	8,800	305	1,973,200	101,616	109,000	4,360

Species.	Monmouth.		Ocean.		Salem.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Bluefish							182,300	$11,620
Bonito							425	15
Cod							848,400	36,540
Croaker							23,700	620
Flounders							13,950	582
Haddock							105,400	4,875
Hake							15,550	446
Kingfish							65	5
Pollock							250	5
Scup							44,800	1,660
Sea bass							572,000	27,490
Squeteague							7,800	240
Total							1,814,640	84,098
Shore fisheries:								
Bluefish	2,084,100	$83,411	58,310	$2,635			2,312,210	97,806
Bonito	132,975	5,006	5,550	225			140,525	5,371
Cod	105,800	4,585	32,500	1,190			363,300	15,615
Croaker	5,800	125	600	20			34,400	895
Eels							350	20
Flounders	181,900	5,390	87,550	2,650			324,950	10,354
Haddock	6,500	260	5,380	210			33,980	1,400
Hake	17,200	355	5,200	200			165,700	7,654
Kingfish							4,300	410
Perch, white							600	20
Scup	22,600	585	9,800	370			127,400	4,825
Sea bass	274,700	8,878	169,600	8,025			953,100	41,983
Sheepshead							675	100
Spot							1,200	40
Squeteague	30,500	885	38,200	1,500	6,000	$480	316,200	12,885
Tautog	140,000	3,850					141,500	3,910
Crabs, hard							600	75
Total	3,002,075	113,330	412,690	17,025	6,000	480	4,920,990	203,363
Grand total	3,002,075	113,330	412,690	17,025	6,000	480	6,735,630	287,461

STATEMENT, BY COUNTIES, OF THE YIELD OF THE GILL-NET FISHERIES OF NEW JERSEY IN 1904.

Species.	Atlantic.		Bergen.		Burlington.		Camden.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives							8,000	$100
Perch, white	5,400	$435						
Shad			200,400	$17,623	268,200	$15,103	14,400	980
Squeteague	1,500	65			12,000	345		
Striped bass	50	5						
Sturgeon					300	38		
Suckers					2,000	200		
Total	6,950	505	200,400	17,623	282,500	15,686	22,400	1,080

Species.	Cape May.		Cumberland.		Gloucester.		Hudson.		Mercer.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Mackerel	10,000	$800								
Total	10,000	800								
Shore fisheries:										
Mackerel	14,000	1,100								
Menhaden	518,000	3,372								
Pike			100	$5						
Shad			402,550	20,042	734,400	$35,698	13,600	$1,230	41,600	$3,120
Sturgeon			45,185	3,116						
Caviar			2,271	1,957						
Suckers			500	25						
Total	532,000	4,472	450,606	25,145	734,400	35,698	13,600	1,230	41,600	3,120
Grand total	542,000	5,272	450,606	25,145	734,400	35,698	13,600	1,230	41,600	3,120

Species.	Monmouth.		Ocean.		Salem.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Bluefish	51,500	$2,050					51,500	$2,050
Butterfish	100	7					100	7
Mackerel	34,610	2,200					44,610	3,000
Squeteague	77,500	1,950					77,500	1,950
Whiting	1,600	40					1,600	40
Total	165,310	6,247					175,310	7,047
Shore fisheries:								
Alewives			43,300	$410			51,300	510
Bluefish	25,800	1,167	31,425	2,055			57,225	3,222
Bonito	15,500	720	500	20			16,000	740
Butterfish	500	18					500	18
Croaker	2,500	37	500	5			3,000	42
Flounders			540	20			540	20
Hickory shad	50	2					50	2
Mackerel	41,000	1,650					55,000	2,750
Menhaden			6,000	15			524,000	3,387
Perch, white			46,450	4,610			51,850	5,045
Pike							100	5
Shad	22,975	2,012			2,045,360	$99,422	3,743,485	195,230
Squeteague	171,250	3,999	139,350	4,996			324,100	9,405
Striped bass			1,045	221			1,095	226
Sturgeon					158,600	7,660	204,085	10,814
Caviar					4,400	3,740	6,671	5,697
Suckers			1,000	50			3,500	275
Whiting	53,900	1,035					53,900	1,035
Total	333,475	10,640	270,110	12,402	2,208,360	110,822	5,096,401	238,423
Grand total	498,785	16,887	270,110	12,402	2,208,360	110,822	5,271,711	245,470

STATEMENT, BY COUNTIES, OF THE YIELD OF THE SEINE FISHERIES OF NEW JERSEY IN 1904.

Species.	Atlantic.		Bergen.		Burlington.		Cape May.		Cumberland.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Bluefish							5,000	$150		
Menhaden									3,124,830	$6,500
Scup							180,000	5,850		
Sea bass							5,000	150		
Squeteague							50,000	1,000		
Total							240,000	7,150	3,124,830	6,500
Shore fisheries:										
Alewives, fresh	16,400	$225			160,000	$425			30,800	194
Alewives, salted					96,000	1,500				
Bluefish	775	55								
Butterfish							200	10		
Catfish	400	20	7,550	$736	12,750	1,061			5,600	288
Chubs	100	2								
Eels	1,300	75					35,000	3,390		
Flounders	9,975	560					4,700	145	100	4
German carp			7,500	890	8,600	620			8,400	547
Kingfish	6,400	330					400	32		
Mullet, fresh							27,000	1,350		
Mullet, salted							3,000	45		
Perch, white	22,950	1,075			26,000	1,750			2,550	153
Pike and pickerel	250	25			50	5				
Salmon, Atlantic					12	3				
Sea bass	1,000	80								
Shad	80	10	700	60	73,600	3,360			7,819	457
Smelt			1,500	270						
Spot	800	65					20,000	1,000		
Squeteague	122,000	7,000					210,500	3,375	3,500	140
Striped bass	1,525	295			8,570	888	400	48	3,450	377
Suckers	1,400	55	15,500	1,540	6,200	390			300	18
Tautog	500	30								
Crabs, hard	21,667	140								
Shrimp	330	100								
Total	207,852	10,142	32,750	3,496	391,782	10,002	301,200	9,395	62,519	2,178
Grand total	207,852	10,142	32,750	3,496	391,782	10,002	541,200	16,545	3,187,349	8,678

Species.	Gloucester.		Hunterdon.		Mercer.		Middlesex.		Monmouth.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Menhaden									8,460,000	$27,000
Total									8,460,000	27,000
Shore fisheries:										
Alewives, fresh	20,000	$100			80,000	$1,250	25,700	$156	3,000	30
Bluefish							8,000	232	15,200	510
Butterfish									200	4
Catfish					400	4	3,940	185		
Eels							70	6	10,100	530
Flounders							1,100	38	5,000	166
German carp					700	41	600	60		
Menhaden							83,000	162	450,000	820
Mullet, fresh									21,000	585
Perch, white					5,000	200	250	15		
Perch, yellow							100	10		
Shad	168,000	9,750	37,000	$2,865	129,520	8,435	7,450	702	3,600	270
Smelt							4,900	980	1,650	162
Spot									4,000	80
Squeteague							45,000	1,510	102,200	2,440
Striped bass	200	20			500	50	1,500	148	4,900	875
Suckers							900	100	14,700	580
Tomcod							350	7		
Whiting									1,000	20
Crabs, hard									3,600	225
Crabs, soft									16,167	2,550
Total	188,200	9,870	37,000	2,865	216,120	9,980	182,860	4,311	656,317	9,847
Grand total	188,200	9,870	37,000	2,865	216,120	9,980	182,860	4,311	9,116,317	36,847

STATEMENT, BY COUNTIES, OF THE YIELD OF THE SEINE FISHERIES OF NEW JERSEY IN 1904—Continued.

Species.	Ocean.		Salem.		Sussex.		Warren.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Bluefish									5,000	$150
Menhaden	15,288,600	$38,245							26,873,430	71,745
Scup									180,000	5,850
Sea bass									5,000	150
Squeteague									50,000	1,000
Total	15,288,600	38,245							27,113,430	78,895
Shore fisheries:										
Alewives, fresh	219,200	1,995	6,000	$120					561,100	4,495
Alewives, salted									96,000	1,500
Bluefish	3,125	75							27,100	872
Butterfish	1,700	50							2,100	64
Catfish	2,750	110	20,800	842					54,190	3,246
Chubs									100	2
Eels									46,470	4,001
Flounders	125	5							21,000	918
German carp			41,500	2,465			1,000	$50	68,300	4,673
Kingfish									6,800	362
Menhaden									533,000	982
Mullet, fresh	6,000	115							54,000	2,050
Mullet, salted									3,000	45
Perch, white	117,050	9,462	2,000	160					175,800	12,815
Perch, yellow									100	10
Pike and pickerel	200	20							500	50
Salmon, Atlantic									12	3
Sea bass									1,000	80
Shad			7,888	290	450	$25	11,220	910	447,327	27,134
Smelt	30	5							8,080	1,417
Spot									24,800	1,145
Squeteague	99,300	2,675							582,500	17,140
Striped bass	10,777	2,325	13,200	1,645					45,022	6,671
Suckers							2,600	256	41,600	2,939
Tautog									500	30
Tomcod	165	5							515	12
Whiting									1,000	20
Crabs, hard	900	40							26,167	405
Crabs, soft	11,433	1,925							27,600	4,475
Shrimp									330	100
Total	472,755	18,807	91,388	5,522	450	25	14,820	1,216	2,856,013	97,656
Grand total	15,761,355	57,052	91,388	5,522	450	25	14,820	1,216	29,969,443	176,551

STATEMENT, BY COUNTIES, OF THE CATCH OF EELS AND LOBSTERS, BY POTS, IN NEW JERSEY IN 1904.

Species.	Atlantic.		Bergen.		Cape May.		Cumberland.		Hudson.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Eels									3,000	$240
Lobsters									45,500	5,715
Total									48,500	5,955
Shore fisheries:										
Eels, fresh	10,500	$480	42,000	$2,800	15,000	$750	1,100	$68	5,400	355
Lobsters									29,500	2,180
Total	10,500	480	42,000	2,800	15,000	750	1,100	68	34,900	2,535
Grand total	10,500	480	42,000	2,800	15,000	750	1,100	68	83,400	8,490

STATEMENT, BY COUNTIES, OF THE CATCH OF EELS AND LOBSTERS BY POTS IN NEW JERSEY IN 1904—Continued.

Species.	Middlesex.		Monmouth.		Ocean.		Salem.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Eels									3,000	$240
Lobsters			18,800	$2,500					64,300	8,215
Total			18,800	2,500					67,300	8,455
Shore fisheries:										
Eels, fresh	6,900	$600	84,525	4,870	51,950	$2,475	11,000	$690	228,375	13,088
Eels, smoked			325	80					325	80
Lobsters	800	120	44,970	7,495	275	36			75,545	9,831
Total	7,700	720	129,820	12,445	52,225	2,511	11,000	690	304,245	22,999
Grand total	7,700	720	148,620	14,945	52,225	2,511	11,000	690	371,545	31,454

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FYKE-NET FISHERIES OF NEW JERSEY IN 1904.

Species.	Burlington.		Cape May.		Cumberland.		Hudson.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives							800	$20
Carp, German							4,000	400
Catfish	6,000	$450			12,700	$966	1,000	100
Eels			11,000	$1,293	2,900	226	2,600	150
Perch, white			2,500	125	300	24		
Salmon, Atlantic							24	15
Shad							55,600	7,630
Striped bass			2,200	270				
Sturgeon							700	51
Caviar							60	39
Total	6,000	450	15,700	1,688	15,900	1,216	64,784	8,405

Species.	Middlesex.		Monmouth.		Ocean.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Flounders			1,900	$100			1,900	$100
Shore fisheries:								
Alewives	3,000	$150	3,500	$77	3,500	$60	10,800	307
Bluefish			600	48			600	48
Butterfish			100	3			100	3
Carp, German							4,000	400
Catfish							19,700	1,516
Dogfish			300	24			300	24
Drum			100	1			100	1
Eels			31,910	2,394			48,410	4,063
Flounders	700	56	49,200	2,107	225,200	10,133	275,100	12,296
Kingfish			94	24			94	24
Menhaden			28,000	67			28,000	67
Perch, white	400	40	2,800	229	4,500	397	10,500	815
Round herring			8,000	90			8,000	90
Salmon, Atlantic							24	15
Shad	3,700	375	2,175	228			61,475	8,233
Sharks			175	2			175	2
Squeteague	1,200	72	22,000	637			23,200	709
Striped bass	600	81	7,835	1,285	255	47	10,890	1,683
Sturgeon							700	51
Caviar							60	39
Suckers					200	10	200	10
Tautog			750	22			750	22
Tomcod	4,300	230	2,000	100	170	5	6,470	335
Whiting			1,000	20			1,000	20
Crabs, hard			9,400	175			9,400	175
King crabs			14,000	75			14,000	75
Lobsters			50	7			50	7
Total	13,900	1,004	183,989	7,615	233,825	10,652	534,098	31,030
Grand total	13,900	1,004	185,889	7,715	233,825	10,652	535,998	31,130

STATEMENT, BY COUNTIES, OF THE YIELD OF THE STOP-NET FISHERIES OF NEW JERSEY IN 1904.

Species.	Bergen.		Burlington.		Cumberland.		Gloucester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Carp, German	50,000	$4,900	19,000	$1,340	54,300	$4,045	100,000	$8,000
Catfish	35,300	3,524			700	56		
Shad	700	75						
Striped bass					400	58		
Suckers	600	48	600	36				
Total	86,600	8,547	19,600	1,376	55,400	4,159	100,000	8,000

Species.	Hudson.		Salem.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:						
Carp, German	15,700	$1,600	92,000	$5,670	331,000	$25,555
Catfish					36,000	3,580
Shad					700	75
Striped bass					400	58
Suckers					1,200	84
Total	15,700	1,600	92,000	5,670	369,300	29,352

STATEMENT, BY COUNTIES, OF THE YIELD OF THE BAG-NET FISHERIES OF NEW JERSEY IN 1904.

Species.	Atlantic.		Burlington.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:						
Catfish			2,400	$70	2,400	$70
Flounders			2,600	100	2,600	100
Perch, white	6,000	$395	8,600	530	14,600	925
Striped bass	235	40	320	50	555	90
Total	6,235	435	13,920	750	20,155	1,185

STATEMENT, BY COUNTIES, OF THE CATCH BY MINOR APPARATUS IN NEW JERSEY IN 1904.

Species.	Atlantic.		Bergen.		Cape May.		Gloucester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Carp, German							5,500	$440
Eels	15,400	$775			7,600	$640		
Striped bass			7,800	$780				
Crabs, hard	19,333	1,200						
Crabs, soft	1,500	300						
Shrimp	3,382	600						
Terrapin	3,000	3,300			1,700	1,150		
Total	42,615	6,175	7,800	780	9,300	1,790	5,500	440

STATEMENT, BY COUNTIES, OF THE CATCH BY MINOR APPARATUS IN NEW JERSEY IN 1904—Continued.

Species.	Monmouth.		Ocean.		Salem.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Swordfish	8,000	$580					8,000	$580
Shore fisheries:								
Carp, German					59,500	$4,305	65,000	4,745
Eels	10,500	540	42,200	$2,325			75,700	4,280
Striped bass							7,800	780
Crabs, hard	41,533	1,975	2,333	85			64,699	3,560
Crabs, soft	85,667	13,250	10,800	1,575			96,467	14,825
Shrimp			1,237	725			4,619	1,325
Terrapin							4,700	4,450
Total	137,700	15,765	56,570	4,710	59,500	4,305	318,985	33,965
Grand total	145,700	16,345	56,570	4,710	59,500	4,305	326,985	34,545

NOTES AND DETAILED STATISTICS OF PRINCIPAL FISHERIES.

Oyster.—By far the greatest oyster-producing region in New Jersey is Maurice River Cove, a branch of Delaware Bay in Cumberland County. The value to the fishermen of the oyster catch in this county in 1904 was $1,046,147. Of this amount, $973,237 is the value of the vessel catch, the balance being taken by boats under 5 tons. Practically all the market oysters are taken from private beds, with dredges. The method of lifting dredges on vessels in this region has undergone some change through the use of a patent lifting machine run by gasoline, thereby dispensing with the labor of one or two men.

The entire coast of New Jersey produces oysters, but the market supply comes chiefly from planted beds, from which the oysters are dredged. The most important of the beds on the outer coast are in Barnegat Bay and Great Bay, but here as elsewhere in 1904 the oysters were poor, and consequently a smaller quantity than usual was taken up. Keyport has a prosperous planting industry, and there are productive planted beds also at Perth Amboy, Chapel Hill, Pleasure Bay, Oceanport, Branchport, and in Atlantic and Cape May counties. In Cape May County the practice of planting shells for collection of spat has become quite profitable. In nearly every locality, however, the number of oyster planters has decreased in the last five years, this being especially the case at Perth Amboy and Chapel Hill. A serious drawback to the enterprise in some places, noticeably in New York and Newark bays and the Shrewsbury River, is a condition of the oysters known as "the greens." Pollution of the streams with refuse from copper refineries has been found to affect the oysters by giving them a greenish color and an unpleasant taste, which even rebedding for a season has not sufficed to remove.

Oysters from the natural rocks are usually too small for market and

are used for seed, being taken with tongs. This feature of the industry has become an important and remunerative business in many places. Lanoka, Bayville, and Forked River furnish market oysters from the natural beds.

The total oyster output of New Jersey for 1905 showed a decrease since 1901 of 40 per cent in quantity and 24 per cent in value.

THE OYSTER FISHERY OF NEW JERSEY IN 1904.

Counties.	Market oysters from natural rock.		Market oysters from private beds.		Seed oysters from natural rock.		Seed oysters from private beds.		Total.	
	Bush.	Value.	Bush.	Value.	Bush.	Value.	Bush.	Value.	Bush.	Value.
Atlantic	......	......	68,325	$66,225	20,060	$8,395	1,000	$400	89,385	$75,020
Burlington	......	......	20,500	17,125	4,000	1,500			24,500	18,625
Camden	......	......	206,712	206,712	80,500	42,175	......	......	287,212	248,887
Cape May	......	......	19,350	23,850	1,850	620	......	......	21,200	24,470
Cumberland	......	......	743,312	743,312	655,600	302,835	......	......	1,398,912	1,046,147
Hudson	12,500	$7,500	......	......	21,500	12,800	......	......	34,000	20,300
Middlesex	......	......	36,000	35,840	20,000	13,500	......	......	56,000	49,340
Monmouth	4,425	3,520	62,132	64,638	3,500	1,700	......	......	70,057	69,858
Ocean	16,535	13,285	119,391	116,501	8,135	3,150	300	120	144,361	133,056
Union	......	......	......	......	9,500	6,250	......	......	9,500	6,250
Total	33,460	24,305	1,275,722	1,274,203	824,645	392,925	1,300	520	2,135,127	1,691,953

Clam.—From Perth Amboy south to Cape May and in Cape May and Cumberland counties on the Delaware Bay side of the state, the New Jersey coast produces large quantities of clams. The chief hard-clam fisheries are carried on at Keyport, Port Monmouth, and Belford, but in other counties, especially Atlantic, many persons depend upon clamming for a livelihood, and from West Creek, Ocean County, to Cape May it is the most important fishery industry next to oyster planting. At Somers Point, Atlantic County, numbers of men and boys come from inland places to dig for clams during the summer season. There has been such a decline in the abundance of this product at Keyport and Port Monmouth that vessel fishing has been to a great extent abandoned, and only small gasoline and row boats are now used. During the warm weather the fishermen often lay aside their tongs and rakes and wade for the clams.

In some localities clams brought from states farther south are laid out in the local waters for a few weeks and then shipped to market. They are said thus to acquire the flavor of the native clam and to become more salable.

Soft clams are not taken south of Point Pleasant, Ocean County, and by far the most of the catch comes from Monmouth County. Highlands and vicinity is the most productive region, and the majority of the inhabitants are dependent upon this fishery. About one-third of the catch is sold opened, the remainder in the shell.

Surf clams are used chiefly for cod bait on trawl lines, the greatest demand being at Atlantic City, which supports the largest trawling

fleet in the state. These clams are sometimes sold in Atlantic City for hard clams, and are said to be as edible as the latter, except that they are with difficulty freed from sand. The taste is somewhat sweeter than that of the hard clam.

Mussel.—Mussels are taken only in Monmouth County, where they are used entirely for food, and in Atlantic County, where a large portion of the catch is used for fertilizer. Some are cleaned and shipped in shell from Atlantic City, and a few are opened and sold locally.

Crab.—Crabs are taken in several of the rivers and estuaries along the coast of New Jersey. In the soft stage they are caught mainly with scoop nets and seines. They are used both for food and as bait on hand lines. In recent years there has been a very noticeable diminution in the catch of soft crabs in New Jersey, and this has resulted in an increased demand upon Maryland and Virginia. In Monmouth County more than one-half the hard-crab catch is taken by vessels using dredges, the season usually extending from November 1 to February 15, and the men remaining aboard of the vessel during that time.

King crab.—Practically the entire king-crab catch is taken in pound nets set in Delaware Bay, off Cape May County. It is sold to factories and converted into fertilizer. This species is more abundant than it was in 1901.

Lobster.—No special effort to catch lobsters is made in this state south of Point Pleasant, Ocean County, and the fishery in 1904 was carried on chiefly by men hailing from Jersey City, Keyport, and Port Monmouth. A few came from Seabright and Long Branch.

Squeteague.—This fish, commonly known as "trout," or "weakfish," is the most abundant of the edible species caught on the New Jersey coast. It is taken chiefly in pound nets and seines, and on lines. It represents the largest part of the pound-net catch.

Shad.—Shad are taken in the Delaware and Hudson rivers, more than 85 per cent of the state's entire catch, however, being taken in the Delaware. Since 1901 this species has decreased 69 per cent in quantity and nearly 50 per cent in value. The greater part of the Hudson River catch is made by men living down the coast, who move up with their gear every spring and remain during the run of shad. The apparatus commonly used in this stream is the stake gill net, but owing to alleged menace to navigation the government has recently placed certain restrictions upon these operations. It is now necessary to secure a permit to fish, and the stakes must be removed at the close of the fishing season. Shad fishing in the Hudson River has been quite profitable in the past, but would now be a total failure if, with the scarcity of fish, there were not the increased prices. A few fishermen living in the southern part of the state, on the Atlantic side, fish for shad in the Delaware River with drift gill nets. By means of

gasoline boats they can make the trips from their homes to the fishing grounds better than they could formerly with sailboats.

The following table shows the number of shad taken in each county of the state in 1904:

NUMBER AND VALUE OF SHAD TAKEN IN EACH COUNTY OF NEW JERSEY IN 1904.

Counties.	No.	Value.	Counties.	No.	Value.
Atlantic	1,737	$710	Mercer	42,780	$11,555
Bergen	57,657	17,758	Middlesex	3,186	1,077
Burlington	89,050	18,463	Monmouth	27,000	8,591
Camden	3,600	980	Ocean	1,849	595
Cape May	1,675	469	Salem	438,200	99,712
Cumberland	94,700	20,499	Sussex	100	25
Gloucester	188,000	45,448	Warren	3,300	910
Hudson	19,771	8,860			
Hunterdon	7,400	2,865	Total	a 980,005	238,517

a 4,337,907 pounds.

Bluefish.—The most prolific bluefish grounds on the American coast lie from 4 to 10 miles off Seabright, N. J., and the most valuable fishery of this, the state's most important fishing center, is the bluefish hand-line fishery. In 1904 it employed 96 gasoline boats, valued at $21,600, and 30 rowboats, valued at $2,500, a total of 126 boats, carrying 275 men. A majority of the men are Scandinavians.

Menhaden.—With the exception of a few menhaden taken in Middlesex County with seines, the entire catch is obtained in Monmouth, Ocean, and Cape May counties. In Monmouth County both pound nets and seines are used, most of the pound-net catch being taken at Port Monmouth and Belford, where it is sold mainly as bait to hand-line fishermen at Seabright and vicinity. Two fertilizer factories at this place utilize large quantities of the seine catch, which is made chiefly by vessels. A number of the vessels are owned by the factories.

THE MENHADEN INDUSTRY OF NEW JERSEY IN 1904.

Items.	No.	Value.
Factories	4	$229,100
Cash capital		51,000
Wages paid factory employees		50,000
Persons in factories	214	
Persons on vessels	226	
Menhaden caught by vessels	44,789,050	71,745
Menhaden caught in shore fisheries	17,893,958	37,345
Menhaden, prest	46,029,050	60,060
Dry scrap ... tons	2,717	72,500
Crude and acidulated scrap ... do	1,575	21,800
Oil ... gallons	150,645	33,110
Steam vessels fishing	6	109,000
Tonnage	392	
Outfit		25,360
Purse seines	6	4,500
Sail vessels fishing	5	7,500
Tonnage	132	
Outfit		4,595
Purse seines	5	2,220
Sail vessels transporting	6	3,300
Tonnage	82	
Outfit		590

Sea bass.—With the exception of a few caught in seines, the entire catch of sea bass is taken with lines and pound nets. The most prolific grounds are off Holly Beach and Anglesea, in Cape May County, and are frequented by line fishermen from these places during the summer. At Seabright sea bass are taken only incidentally with bluefish by the line fishermen, but here the reverse is the case. A great many are taken by vessels from Atlantic City also. Most of the catch shown under pound nets was caught along the coast of Monmouth and Ocean counties.

Cod.—The most important cod fisheries are conducted from Atlantic City and Anglesea. With the introduction of gasoline engines on boats, and the consequently improved facilities for reaching the fishing grounds, this industry is prosecuted with much more vigor than formerly.

In the fall of 1905 The Fisheries Company made an innovation in the method of catching cod off New Jersey by fitting up a menhaden steamer with an otter trawl similar to those used by English fishermen in the North Sea. In one day 32,000 pounds of cod were taken, but owing to the fact that the company had not proper facilities for freezing the fish, and found it unprofitable to place such a large quantity on the market at one time, fishing was discontinued for the season.

Trawl-line fishermen in New Jersey, as in other states along the coast, complain of the ravages of the dogfish, which eat either the bait or the fish that have been caught.

Butterfish.—This species is very abundant along the coast of New Jersey. It is taken in large quantities in pound nets, and ranks second, or next to squeteague, in value among the species taken in that apparatus. In one pound-net fishery off High Point, Ocean County, butterfish were taken in much larger quantities than squeteague even, and constituted nearly two-thirds of the entire catch.

Carp.—This fish, which is one of the most marketable in the state, is made the special object of capture in several counties, especially in those bordering on the Delaware River. Three-fourths of the catch is made in stop nets (or "set nets," as they are sometimes called) and the balance in seines and cast nets. The stop nets commonly used are about 7 feet deep, with a 4-inch mesh, and are fished from early in the spring until ice forms in the fall or winter. They are set at high water, nearly parallel to the shore, with a slight curve out toward the channel. As the tide recedes, the fish, caught behind the net, are unable to escape. They are removed at low water or when there is about 1 foot of water back of the net.

New York City continues to be a very profitable market for carp, and fishermen living along the Hackensack River, especially favored by their proximity to the city, receive high prices for this fish.

Jewish dealers drive direct from New York City to the fishing shores and have been known to pay as high as 26 cents a pound for carp.

Striped bass and white perch.—Since 1901 the catch of striped bass has decreased 81 per cent in quantity and 80 per cent in value, and white perch 80 per cent in quantity and 75 per cent in value. Until recently the capture of these two species furnished remunerative employment to many fishermen during the winter months, especially along Barnegat Bay, but in the present scarcity the fishery hardly pays. Striped bass were particularly scarce in 1904. Seines and gill nets are the apparatus commonly used for their capture, these being fished mostly through the ice. The Mullica River, in Burlington County, one of the principal spawning streams in the state, has also been very prolific in these two species, but in 1904 the catch was very light. Bag nets and seines are the apparatus used in this river, the former being commonly fished through the ice in from 20 to 30 feet of water.

Sturgeon.—Comparatively little change has taken place in the sturgeon fishery since 1901. The largest catches are taken with gill nets in the Delaware River in Salem and Cumberland counties. A few are taken also in pound nets set in the ocean. The value of the fishery is much enhanced by the preparation of caviar from the eggs.

The following table shows the quantity and value of sturgeon, including caviar, taken in New Jersey in various years since 1890:

Year.	Lbs.	Value.	Year.	Lbs.	Value.
1890	3,635,350	$90,085	1898	868,326	$100,966
1891	3,520,370	86,419	1901	188,027	19,352
1892	3,187,342	64,982	1904	235,952	19,737
1897	1,013,604	94,056			

Whiting.—This species, which is also locally called "winter weakfish" and "frost-fish," was difficult to market a few years ago, but now brings a fair price. It is taken in large quantities from November to February, many pound nets being kept in use after the regular season especially for its capture.

FISHERIES OF PENNSYLVANIA.

GENERAL AND COMPARATIVE STATISTICS.

The number of persons employed in the fisheries of Pennsylvania in 1904 was 1,412. Of these, 117 were on fishing vessels, 703 in shore or boat fisheries, and 592 were shoresmen, principally employees of the wholesale fish and oyster establishments of Philadelphia. The total investment was $2,097,715. The number of vessels was 16, valued at $48,200, having a net tonnage of 286, with outfits

valued at $6,785. The number of row and gasoline boats was 243, valued at $10,685. The value of the fishing apparatus employed in the shore and vessel fisheries was $15,130, of shore and accessory property, $846,915, and the cash capital was $1,170,000. The products of the fisheries consisted of 1,215,394 pounds of fish, worth $63,209, and 118,700 bushels of oysters, with a value of $104,290, the total value of fish and oysters being $167,499.

Compared with 1901 the decrease in employees is 1,072; the products show a decrease in pounds from 6,029,538 to 2,046,294, and in value from $251,491 to $167,499. The catch of shad has decreased from 703,031 to 188,571 in the number of fish, or from 2,982,868 pounds, valued at $124,328, to 835,544 pounds, valued at $52,472. Alewives, fresh and salted, have decreased from 1,135,925 pounds, $9,408, to 269,800 pounds, $3,540; catfish from 193,199 pounds, $10,163, to 17,200 pounds, $1,147; eels from 140,504 pounds, $6,151, to 60,650 pounds, $4,146; and German carp from 161,895 pounds, $9,795, to 10,350 pounds, $549.

The accompanying tables show in detail the persons, apparatus, and products of the fisheries of Pennsylvania in 1904:

NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF PENNSYLVANIA IN 1904.

How engaged.	No.
On vessels fishing	117
In shore or boat fisheries	703
Shoresmen	592
Total	1,412

INVESTMENT IN THE FISHERIES OF PENNSYLVANIA IN 1904.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	16	$48,200	Apparatus—shore fisheries—Ctd.		
Tonnage	286		Stop nets	1	$100
Outfit		6,785	Fyke nets	159	383
Boats	232	7,285	Dip nets	98	482
Gasoline boats	11	3,400	Lines		7
Apparatus—vessel fisheries:			Fish baskets	57	1,195
Dredges	32	3,017	Shore and accessory property		846,915
Apparatus—shore fisheries:			Cash capital		1,170,000
Seines	73	5,814			
Gill nets	90	4,132	Total		2,097,715

PRODUCTS OF THE FISHERIES OF PENNSYLVANIA IN 1904.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives, fresh	97,800	$615	Striped bass	6,300	$687
Alewives, salted	172,000	2,925	Sturgeon	11,250	506
Catfish	17,200	1,147	Suckers	2,600	114
Eels	60,650	4,146	Oysters, market	[a] 630,000	90,000
German carp	10,350	549	Oysters, seed	[b] 200,900	14,290
Mullet	1,700	48			
Shad	835,544	52,472	Total	2,046,294	167,499

[a] 90,000 bushels. [b] 28,700 bushels.

THE FISHERIES BY COUNTIES.

In 1904 the fisheries of eastern Pennsylvania were prosecuted in Bucks, Delaware, Northampton, Philadelphia, and Pike counties on the Delaware River, and in Cumberland, Dauphin, Juniata, Lancaster, Perry, and York counties on the Susquehanna River. The extent of the fisheries in each of these counties in 1904 is shown in the following tables:

STATEMENT BY COUNTIES OF THE NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF PENNSYLVANIA IN 1904.

Counties.	On vessels fishing.	In shore or boat fisheries.	Shoresmen.	Total.
Bucks		141		141
Cumberland		4		4
Dauphin		48		48
Delaware		58	15	73
Juniata		24		24
Lancaster		141		141
Northampton		8		8
Perry		34		34
Philadelphia	117	48	577	742
Pike		23		23
York		174		174
Total	117	703	592	1,412

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND SHORE PROPERTY EMPLOYED IN THE FISHERIES OF PENNSYLVANIA IN 1904.

Items.	Bucks.		Cumberland.		Dauphin.		Delaware.		Juniata.		Lancaster.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Boats	25	$1,018	4	$40	15	$409	26	$2,305	3	$25	62	$885
Gasoline boats							10	3,150				
Apparatus—shore fisheries:												
Seines	18	1,738			5	555	1	150	3	90	16	1,355
Gill nets	6	135					27	3,200			29	225
Fyke nets							50	150			42	81
Dip nets											14	68
Lines												6
Fish baskets			4	150	7	310					34	505
Shore and accessory property		1,575				390		11,750				565
Cash capital								6,000				
Total		4,466		190		1,664		26,705		115		3,690

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND SHORE PROPERTY EMPLOYED IN THE FISHERIES OF PENNSYLVANIA IN 1904—Continued.

Items.	Northampton.		Perry.		Philadelphia.		Pike.		York.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels, fishing					16	$48,200					16	$48,200
Tonnage					286						286	
Outfit						6,785						6,785
Boats	2	$23	14	$245	17	1,050	5	$60	59	$1,225	232	7,285
Gasoline boats					1	250					11	3,400
Apparatus—vessel fisheries:												
Dredges					32	3,017					32	a 3,017
Apparatus—shore fisheries:												
Seines	1	25	4	220	2	630	5	101	18	950	b 73	5,814
Gill nets					10	450			18	122	c 90	4,132
Stop nets					1	100					d 1	100
Fyke nets					37	90			30	62	159	383
Dip nets			7	35					77	379	98	482
Lines						1						7
Fish baskets			3	90					9	140	57	1,195
Shore and accessory property				100		832,360		10		165		846,915
Cash capital						1,164,000						1,170,000
Total		48		690		2,056,933		171		3,043		2,097,715

a Includes 6 patent winders, value, $2,100.
b 13,135 yards.
c 28,625 yards.
d 750 yards

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF PENNSYLVANIA IN 1904.

Species.	Bucks.		Cumberland.		Dauphin.		Delaware.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	56,000	$350					40,000	$250
Alewives, salted	172,000	2,925						
Catfish	1,000	50					2,500	170
Eels			4,200	$336	11,050	$834	1,500	90
German carp	1,575	68			2,000	80		
Shad	257,975	17,440			16,650	1,480	175,500	11,520
Striped bass	300	27					6,000	660
Sturgeon							11,250	506
Suckers	2,100	100						
Total	490,950	20,960	4,200	336	29,700	2,394	236,750	13,196

Species.	Juniata.		Lancaster.		Northampton.		Perry.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh			1,800	$15				
Catfish			4,650	230				
Eels			26,500	1,535			5,000	$400
German carp			1,450	42	75	$3		
Mullet			950	27				
Shad	7,200	$570	108,094	6,217	1,125	30	27,225	2,420
Suckers			300	8				
Total	7,200	570	143,744	8,074	1,200	33	32,225	2,820

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF PENNSYLVANIA IN 1904—Continued.

Species.	Philadelphia.		Pike.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh							97,800	$615
Alewives, salted							172,000	2,925
Catfish	5,500	$520			3,550	$177	17,200	1,147
Eels	4,000	330			8,400	621	60,650	4,146
German carp	4,000	320			1,250	36	10,350	549
Mullet					750	21	1,700	48
Shad	49,400	3,115	7,200	$500	185,175	9,180	835,544	52,472
Striped bass							6,300	687
Sturgeon							11,250	506
Suckers					200	6	2,600	114
Oysters, market	630,000	90,000					630,000	90,000
Oysters, seed	200,900	14,290					200,900	14,290
Total	893,800	108,575	7,200	500	199,325	10,041	2,046,294	167,499

THE FISHERIES BY APPARATUS.

The vessel fisheries of the eastern part of Pennsylvania in 1904 were confined to Philadelphia County, and were prosecuted by 16 vessels, valued at $48,200, engaged in dredging oysters. The catch consisted of 90,000 bushels of market oysters, valued at $90,000, and 28,700 bushels of seed oysters, valued at $14,290, a total of 118,700 bushels, valued at $104,290.

In the shore or boat fisheries seines took 767,564 pounds of fish of various species, valued at $36,088; gill nets, 267,955 pounds, valued at $17,283; dip nets, 97,625 pounds, valued at $4,415; fish baskets, 57,100 pounds, valued at $3,748; and fyke nets, stop nets, and lines, 25,150 pounds, valued at $1,675.

The following tables give the quantity and value of products taken in the vessel and shore fisheries by each form of apparatus:

YIELD OF THE VESSEL FISHERIES OF PENNSYLVANIA IN 1904.

Species and apparatus.	Philadelphia County.	
	Lbs.	Value.
Dredges:		
Oysters, market	630,000	$90,000
Oysters, seed	200,900	14,290
Total	830,900	104.290

STATEMENT, BY COUNTIES, OF THE YIELD OF THE SEINE FISHERIES OF PENNSYLVANIA IN 1904.

Species.	Bucks.		Dauphin.		Delaware.		Juniata.		Lancaster.		Northampton.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	56,000	$350			40,000	$250			1,600	$13		
Alewives, salted	172,000	2,925										
Catfish	1,000	50			1,000	80						
German carp	1,575	68	2,000	$80							75	$3
Shad	248,850	16,800	16,650	1,480			7,200	$570	67,864	3,647	1,125	30
Striped bass	300	27			5,000	500						
Suckers	2,100	100										
Total	481,825	20,320	18,650	1,560	46,000	830	7,200	570	69,464	3,660	1,200	33

Species.	Perry.		Philadelphia.		Pike.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh									97,600	$613
Alewives, salted									172,000	2,925
Catfish			500	$40					2,500	170
German carp			2,000	160					5,650	311
Shad	13,725	$1,220	20,800	1,300	7,200	$500	99,000	$5,895	482,414	31,442
Striped bass									5,300	527
Suckers									2,100	100
Total	13,725	1,220	23,300	1,500	7,200	500	99,000	5,895	767,564	36,088

STATEMENT, BY COUNTIES, OF THE YIELD OF THE GILL-NET FISHERIES OF PENNSYLVANIA IN 1904.

Species.	Bucks.		Delaware.		Lancaster.		Philadelphia.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shad	9,125	$640	175,500	$11,520	28,980	$2,037	28,600	$1,815	13,500	$605	255,705	$16,617
Striped bass			1,000	160							1,000	160
Sturgeon			11,250	506							11,250	506
Total	9,125	640	187,750	12,186	28,980	2,037	28,600	1,815	13,500	605	267,955	17,283

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FYKE-NET AND STOP-NET FISHERIES OF PENNSYLVANIA IN 1904.

Apparatus and species.	Delaware.		Lancaster.		Philadelphia.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Fyke nets:										
Catfish	1,500	$90	1,550	$82	5,000	$480	2,000	$100	10,050	$752
Eels	1,500	90	2,300	129	1,000	90	2,500	125	7,300	434
German carp			250	7			900	27	1,150	34
Mullet			300	9			550	15	850	24
Suckers							100	3	100	3
Total	3,000	180	4,400	227	6,000	570	6,050	270	19,450	1,247
Stop nets:										
German carp					2,000	160				
Grand total	3,000	180	4,400	227	8,000	730	6,050	270	19,450	1,247

Statement, by Counties, of the Yield of the Dip-net Fisheries of Pennsylvania in 1904.

Species.	Lancaster.		Perry.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	200	$2	....	....	....	....	200	$2
Shad	11,250	533	13,500	$1,200	72,675	$2,680	97,425	4,413
Total	11,450	535	13,500	1,200	72,675	2,680	97,625	4,415

Statement, by Counties, of the Yield of the Line Fisheries of Pennsylvania in 1904.

Species.	Lancaster.		Philadelphia.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Catfish	200	$10	....	....	200	$10
Eels	200	10	3,000	$240	3,200	250
German carp	150	4	....	....	150	4
Suckers	150	4	....	....	150	4
Total	700	28	3,000	240	3,700	268

Statement, by Counties, of the Yield of the Fish-basket Fisheries of Pennsylvania in 1904.

Species.	Cumberland.		Dauphin.		Lancaster.		Perry.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Catfish	......	......	......	......	2,900	$138	......	......	1,550	$77	4,450	$215
Eels	4,200	$336	11,050	$834	24,000	1,396	5,000	$400	5,900	496	50,150	3,462
German carp	......	......	......	......	1,050	31	......	......	350	9	1,400	40
Mullet	......	......	......	......	650	18	......	......	200	6	850	24
Suckers	......	......	......	......	150	4	......	......	100	3	250	7
Total	4,200	336	11,050	834	28,750	1,587	5,000	400	8,100	591	57,100	3,748

NOTES AND DETAILED STATISTICS OF PRINCIPAL FISHERIES.

The oyster fishery, which is credited to Philadelphia County, is prosecuted in Delaware Bay by boats owned in Philadelphia.

The recent decrease in the catch of fish in the Delaware and Susquehanna rivers is attributable to excessive fishing in the lower stretches of the rivers and about their mouths, and in some degree to pollution of the waters with acids, dyestuffs, and other factory refuse.

The following supplementary table shows the number and value of shad caught in each county on these two rivers in 1904:

Counties.	No.	Value.	Counties.	No.	Value.
Bucks	57,350	$17,440	Perry	6,050	$2,420
Dauphin	3,700	1,480	Philadelphia	12,350	3,115
Delaware	40,500	11,520	Pike	1,600	500
Juniata	1,600	570	York	41,150	9,180
Lancaster	24,021	6,217			
Northampton	250	30	Total	188,571	52,472

WHOLESALE TRADE.

NUMBER OF PERSONS EMPLOYED AND THE CAPITAL INVESTED IN THE WHOLESALE FISHERY TRADE OF PHILADELPHIA AND CHESTER IN 1904.

Items.	Philadelphia.		Chester.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Establishments	83	$821,510	4	$11,450	87	$832,960
Cash capital		1,164,000		6,000		1,170,000
Wages paid		353,475		3,000		356,475
Persons engaged	577		15		592	

FISHERIES OF DELAWARE.

GENERAL AND COMPARATIVE STATISTICS.

The returns for the fishery industries of Delaware for 1904 show little change in the totals from those of previous years. Compared with 1901 the number of persons engaged decreased from 1,998 to 1,899; the value of vessels, boats, apparatus of capture, shore property, etc., increased from $657,197 to $669,995, and the catch decreased from 5,835,186 pounds to 5,608,289 pounds, but its value increased from $203,372 to $259,590.

The most important fishery product of Delaware is the oyster, the yield of which in 1904 amounted to 241,575 bushels, worth $93,684, or 36 per cent of the value of the total products. Of this yield, 105,000 bushels were market oysters from public reefs, 10,400 bushels were market oysters from private areas, and the remaining 126,175 bushels were seed oysters from the public reefs. In addition, large quantities of market oysters were taken from private areas owned by residents of Pennsylvania and New Jersey, to which states they have been credited. In 1901 the yield of oysters credited to Delaware was only 173,190 bushels, for which the fishermen received $62,608.

Next in rank to the oyster industry comes the shad fishery, with a yield in 1904 of 237,755 fish, worth $67,928, or 26 per cent of the total for the state. The yield in 1901 was 341,988 shad, for which the fishermen received $56,605, an average of 17 cents per fish, while the average in the year covered by these returns was 28 cents. Owing to this increase in price of the fish, the shad fishery in 1904 was very profitable.

The catch of minor species of fish in this state in 1904 compares favorably with that in 1901. The yield of eels increased from 230,650 pounds to 268,255 pounds; German carp from 198,040 pounds to 216,560 pounds; squeteague from 722,435 pounds to 773,300 pounds, and sturgeon, including caviar, from 86,199 pounds to 91,295 pounds. The principal decreases in the same period have been in alewives, from 597,374 pounds to 344,860 pounds; white perch, from 242,360

pounds to 186,050 pounds, and catfish, from 130,280 pounds to 108,170 pounds. Owing to the high price of caviar, the yield of the sturgeon fishery increased in value from $10,444 to $11,438. The output of caviar in 1904 was only 7,495 pounds, which was the smallest in more than twenty years.

The following tables show, by counties, the extent of the fisheries of Delaware in 1904. A separate statement of the menhaden industry is given also:

STATEMENT, BY COUNTIES, OF THE NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF DELAWARE IN 1904.

Items.	Kent.	New-castle.	Sussex.	Total.
On vessels fishing	107	....	....	107
On vessels transporting	5	....	15	20
In shore or boat fisheries	427	320	621	1,368
Shoresmen	6	20	378	404
Total	545	340	1,014	1,899

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND SHORE PROPERTY EMPLOYED IN THE FISHERIES OF DELAWARE IN 1904.

Items.	Kent.		Newcastle.		Sussex.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	28	$18,050	......	....	......	....	28	$18,050
Tonnage	225	....	......	....	......	....	225	....
Outfit	......	3,226	......	....	......	....	......	3,226
Vessels transporting	2	3,600	......	....	5	$2,900	7	6,500
Tonnage	50	....	......	....	57	....	107	....
Outfit	......	125	......	....	......	610	......	735
Boats, row and sail	338	9,216	154	$10,425	423	5,757	915	25,398
Boats, motor	4	1,215	41	13,945	......	....	45	15,160
Apparatus—vessel fisheries:								
Dredges	56	1,476	......	....	......	....	56	1,476
Tongs	36	212	......	....	......	....	36	212
Apparatus—shore fisheries:								
Pound nets	39	1,460	3	120	......	....	42	1,580
Seines (total length 25,328 yards)	51	2,920	28	1,725	100	3,465	179	8,110
Drift nets—								
Shad (total length 113,945 yards)	57	2,552	97	9,280	76	926	230	12,758
Sturgeon (total length 24,990 yards)	7	660	26	1,980	26	1,235	59	3,875
Miscellaneous (total length 20,000 yards)	7	875	8	1,160	......	....	15	2,035
Stake gill nets (total length 14,760 yards)	68	230	......	....	308	1,301	376	1,531
Fyke nets	272	282	628	708	98	314	998	1,304
Eel pots	40	20	570	360	1,185	446	1,795	826
Eel spears	......	....	......	....	42	17	42	17
Lobster pots	......	....	......	....	50	60	50	60
Lines	......	10	......	17	......	15	......	42
Bow nets	7	21	......	....	5	10	12	31
Dredges	8	140	......	....	......	....	8	140
Tongs	155	905	......	....	47	224	202	1,129
Rakes	10	34	......	....	25	53	35	87
Other apparatus	......	132	......	....	......	41	......	173
Shore and accessory property	......	9,760	......	7,270	......	325,510	......	342,540
Cash capital	......	2,500	......	....	......	220,500	......	223,000
Total	......	59,621	......	46,990	......	563,384	......	669,995

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF DELAWARE IN 1904.

Species.	Kent.		Newcastle.		Sussex.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	4,000	$72	107,880	$1,171	232,980	$3,252	344,860	$4,495
Black bass			420	50			420	50
Bluefish					250	15	250	15
Carp, German	55,840	3,500	160,720	10,599			216,560	14,099
Catfish	43,770	2,893	52,850	2,381	11,550	541	108,170	5,815
Cod					800	36	800	36
Croaker	17,450	298			7,700	208	25,150	506
Drum	3,500	70					3,500	70
Eels	23,460	1,356	91,030	4,969	153,765	7,712	268,255	14,037
Flounders					4,100	187	4,100	187
Mullet					4,000	135	4,000	135
Perch, white	43,350	3,171	12,010	1,066	130,690	6,452	186,050	10,689
Pike	2,900	215			8,150	329	11,050	544
Sea bass					600	30	600	30
Shad	133,400	10,091	669,160	48,182	148,460	9,655	951,020	67,928
Spot					15,000	1,048	15,000	1,048
Squeteague	440,300	7,368	6,500	322	326,500	7,783	773,300	15,473
Striped bass	15,737	1,954	5,400	650	19,260	2,232	40,397	4,836
Sturgeon	5,355	306	67,830	3,739	10,615	510	83,800	4,555
Caviar	825	758	5,380	4,915	1,290	1,210	7,495	6,883
Suckers	2,800	112	10,670	420			13,470	532
Tautog					6,000	300	6,000	300
Crabs, soft					134,467	5,960	[a] 134,467	5,960
King crabs	665,000	2,385					665,000	2,385
Lobsters					2,600	286	2,600	286
Oysters:								
Market, public reefs	486,500	25,939			248,500	12,510	[b] 735,000	38,449
Market, private areas	72,800	9,064					[c] 72,800	9,064
Seed, public reefs	883,225	46,171					[d] 883,225	46,171
Clams	3,040	472			7,024	1,121	[e] 10,064	1,593
Turtles	8,200	497	29,010	2,235	3,000	156	40,210	2,888
Terrapin	320	280	24	18	332	233	676	531
Total	2,911,772	116,972	1,218,884	80,717	1,477,633	61,901	5,608,289	259,590

[a] 403,401 in number.
[b] 105,000 bushels.
[c] 10,400 bushels.
[d] 126,175 bushels.
[e] 1,258 bushels.

STATEMENT, BY COUNTIES, OF THE YIELD OF THE VESSEL FISHERIES OF DELAWARE IN 1904.

Apparatus and species.	Kent County.	
	Lbs.	Value.
Dredges and tongs:		
Oysters, market, from public reefs	8,400	$440
Oysters, market, from private areas	62,300	8,464
Oysters, seed, from public reefs	407,785	23,463
Total	478,485	32,367

STATEMENT, BY COUNTIES AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF DELAWARE IN 1904.

Apparatus and species.	Kent.		Newcastle.		Sussex.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Gill nets:								
Alewives			19,400	$226	18,150	$296	37,550	$522
Catfish	14,250	$1,050			700	31	14,950	1,081
Croaker	600	18					600	18
Drum	1,000	20					1,000	20
Flounders					3,000	139	3,000	139
Perch, white	23,150	1,772	7,260	710	38,600	2,113	69,010	4,595
Pike	2,600	200			1,300	52	3,900	252
Shad	109,520	8,106	668,560	48,140	79,620	4,992	857,700	61,238
Spot					12,000	900	12,000	900
Squeteague	1,500	34			11,800	239	13,300	273
Striped bass	7,770	962	4,000	480	6,100	699	17,870	2,141
Sturgeon	5,355	306	67,830	3,739	10,615	510	83,800	4,555
Caviar	825	758	5,380	4,915	1,290	1,210	7,495	6,883
Suckers	2,800	112					2,800	112
Turtles	500	35					500	35
Total	169,870	13,373	772,430	58,210	183,175	11,181	1,125,475	82,764
Pound nets:								
Carp, German	18,000	1,180	2,400	126			20,400	1,306
Catfish			2,000	110			2,000	110
Perch, white			150	13			150	13
Squeteague			300	12			300	12
Striped bass			800	96			800	96
Terrapin			24	18			24	18
King crabs	665,000	2,385					665,000	2,385
Total	683,000	3,565	5,674	375			688,674	3,940
Seines:								
Alewives	4,000	72	88,480	945	203,230	2,789	295,710	3,806
Black bass			420	50			420	50
Carp, German	31,400	1,880	143,520	9,747			174,920	11,627
Catfish	6,120	386	22,250	961	10,850	510	39,220	1,857
Croaker	16,850	280			5,200	103	22,050	383
Drum	2,500	50					2,500	50
Eels	2,110	112	5,400	290	18,475	927	25,985	1,329
Flounders					1,100	48	1,100	48
Mullet					4,000	135	4,000	135
Perch, white	18,550	1,274	2,850	203	78,440	3,657	99,840	5,134
Pike					6,850	277	6,850	277
Shad	21,760	1,800	600	42	68,000	4,595	90,360	6,437
Spot					3,000	148	3,000	148
Squeteague	376,500	5,479	6,200	310	302,400	7,052	685,100	12,841
Striped bass	7,967	992	600	74	13,160	1,533	21,727	2,599
Suckers			5,670	220			5,670	220
Terrapin	320	280			262	184	582	464
Turtles			6,760	590			6,760	590
Total	488,077	12,605	282,750	13,432	714,967	21,958	1,485,794	47,995
Fyke nets:								
Alewives					11,600	167	11,600	167
Carp, German	200	10	14,800	726			15,000	736
Catfish	11,700	595	28,600	1,310			40,300	1,059
Eels	18,350	1,064	50,200	2,762	700	35	69,250	3,861
Perch, white	1,000	60	1,750	140	13,650	682	16,400	288
Pike	300	15					300	15
Suckers			5,000	200			5,000	200
Turtles	6,100	398			1,800	96	7,900	494
Total	37,650	2,142	100,350	5,138	27,750	980	165,750	8,260
Lines:								
Bluefish					250	15	250	15
Cod					800	36	800	36
Croaker					2,500	105	2,500	105
Sea bass					600	30	600	30
Squeteague	62,300	1,855			12,300	492	74,600	2,347
Tautog					6,000	300	6,000	300
Turtles	1,600	64	22,250	1,645	1,200	60	25,050	1,769
Total	63,900	1,919	22,250	1,645	23,650	1,038	109,800	4,602

STATEMENT, BY COUNTIES AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF DELAWARE IN 1904—Continued.

Apparatus and species.	Kent.		Newcastle.		Sussex.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Pots:								
Eels	3,000	$180	35,430	$1,917	99,990	$4,998	138,420	$7,095
Lobsters					2,600	286	2,600	286
Total	3,000	180	35,430	1,917	102,590	5,284	141,020	7,381
Spears:								
Eels					34,600	1,752	34,600	1,752
Minor nets:								
Carp, German	6,240	430					6,240	430
Catfish	11,700	862					11,700	862
Perch, white	650	65					650	65
Shad	2,120	185			840	68	2,960	253
Crabs, soft					134,467	5,960	134,467	5,960
Total	20,710	1,542			135,307	6,028	156,017	7,570
Dredges, tongs, etc.:								
Oysters, market, from public reefs	478,100	25,499			248,500	12,510	726,600	38,009
Oysters, market, from private areas	10,500	600					10,500	600
Oysters, seed, from public reefs	475,440	22,708					475,440	22,708
Clams	3,040	472			7,024	1,121	10,064	1,593
Total	967,080	49,279			255,524	13,631	1,222,604	62,910
Other apparatus:								
Terrapin					70	49	70	49
Grand total	2,433,287	84,605	1,218,884	80,717	1,477,633	61,901	5,129,804	227,223

THE MENHADEN INDUSTRY.

Items.	No.	Value.
Factories	1	$300,000
Cash capital		200,000
Persons in factories	204	
Menhaden utilized	114,060,000	228,120
Tons of dried scrap	7,240	165,745
Gallons of oil made	429,850	89,230

THE FISHERIES OF MARYLAND.

GENERAL AND COMPARATIVE STATISTICS.

In 1897 Maryland held first rank among the Middle Atlantic States for the value of its fisheries. The oyster industry, however, was by far the most important of these, and its rapid decline by 1901 had brought Maryland down to fourth place, to remain there ever since. Recent legislation affecting the oyster grounds is expected to prove effective in restoring the industry to its former productiveness and value.

The total number of persons employed in the fisheries of Maryland in 1904 was 30,337. Of this number 14,397 were occupied in the shore fisheries; 10,283 were engaged on shore in oyster shucking, crab-packing, and other branches of the fisheries; 4,290 were engaged on fishing vessels, and 1,367 on transporting vessels. Since

1901 there has been a decrease of 5,923, or 16 per cent, in the total number of men thus engaged, mainly because of the decline of the oyster fishery and the consequent reduction of force in oyster shucking and canning houses.

The total investment in the fisheries was $5,983,465, a decrease of $522,601, or 8 per cent, since 1901. Of this, $2,314,650 represents the cash capital employed, $1,798,505 the amount invested in shore and accessory property, $1,063,259 the value of 777 fishing and 438 transporting vessels with their outfits, $470,851 the value of 9,276 boats under 5 tons. The remainder, $336,200, represents the value of the apparatus used.

The total products of this state in 1904 were 81,128,866 pounds, valued at $3,336,560, showing, since 1901, a decrease of 2 per cent in quantity and 11 per cent in value. The most important increases in catch were in menhaden and crabs, the greatest decreases in oysters and shad. Increased values are shown for crabs, alewives, menhaden, and several other species, but the total of this is small compared with the decreased value of the oyster product.

The following tables show the number of persons engaged in the fisheries, the number and value of vessels, boats, and apparatus used, the value of the shore and accessory property and cash capital employed, and the quantity and value of products taken in the fisheries of the state in 1904:

NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF MARYLAND IN 1904.

How engaged.	No.
On vessels fishing	4,290
On vessels transporting	1,367
In shore or boat fisheries	14,397
Shoresmen	10,283
Total	30,337

INVESTMENT IN THE FISHERIES OF MARYLAND IN 1904.

Items.	No.	Value.
Vessels fishing	777	$423,130
Tonnage	7,528	
Outfit		115,468
Vessels transporting	438	453,500
Tonnage	11,463	
Outfit		71,161
Boats, sail and row	9,232	450,956
Boats, gasoline	44	19,895
Apparatus—vessel fisheries:		
Oyster dredges	3,030	53,981
Crab scrapes	167	542
Tongs	54	498
Seines	[a] 10	4,250
Eel pots	1,731	1,036
Apparatus—shore fisheries:		
Seines	[b] 224	19,181
Gill nets	[c] 3,835	45,749
Apparatus—shore fisheries—Continued.		
Pound nets	963	$98,320
Fyke nets	5,004	15,314
Trammel nets	[d] 15	1,410
Bow nets	103	502
Minor nets	2,284	1,067
Lines		6,257
Eel pots	2,796	1,405
Spears	39	45
Oyster dredges	2,123	20,856
Crab scrapes	2,488	8,058
Tongs and nippers	10,068	57,729
Shore and accessory property		1,798,505
Cash capital		2,314,650
Total		5,983,465

[a] Total length, 2,640 yards.
[b] Total length, 45,125 yards.
[c] Total length, 434,587 yards.
[d] Total length, 3,620 yards.

PRODUCTS OF THE FISHERIES OF MARYLAND IN 1904.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives, fresh	9,589,430	$55,263	Scup	31,610	$2,558
Alewives, salted	4,895,540	82,719	Sea bass	59,600	2,580
Black bass	14,150	1,325	Shad	2,912,249	159,772
Bluefish	91,460	3,855	Sheepshead	950	68
Bonito	3,150	102	Spanish mackerel	1,950	241
Butterfish	375,062	9,890	Spot	13,480	411
Carp, German	139,280	4,633	Squeteague	785,215	23,207
Catfish	491,435	18,381	Striped bass	721,240	72,207
Cero	5,130	156	Sturgeon	164,245	8,313
Cod	310	12	Caviar	20,600	18,722
Croaker	165,840	2,688	Suckers	2,775	72
Drum	30,975	301	Sunfish	7,450	487
Eels, fresh	250,165	10,705	Crabs, hard	[a] 12,665,282	168,996
Eels, salted	76,300	2,214	Crabs, soft	[b] 5,732,865	189,851
Flounders	35,005	1,192	Shrimp	2,400	800
Gar pike	4,000	10	Squid	14,000	418
Gizzard shad	7,225	136	Oysters, market, natural rock	[c] 27,032,950	2,098,992
Hickory shad	4,500	90			
Kingfish	7,610	940	Oysters, market, private beds	[d] 3,251,955	301,650
Mackerel	16,240	1,296			
Menhaden	9,849,400	20,189	Oysters, seed, natural rock	[e] 722,645	17,032
Mullet	24,935	745	Clams, hard	[f] 37,800	4,880
Perch, white	545,053	30,841	Turtles	13,400	456
Perch, yellow	265,470	10,685	Terrapin	3,923	2,718
Pike	42,317	3,716			
Pompano	300	45	Total	81,128,866	3,336,560

[a] 37,995,846 in number.
[b] 17,198,595 in number.
[c] 3,861,850 bushels.
[d] 464,565 bushels.
[e] 103,235 bushels.
[f] 4,725 bushels.

THE FISHERIES BY COUNTIES.

The leading county in the value of its fishery products is Somerset, the bulk of whose output consists of oysters and crabs. Dorchester County ranks second in the amount and value of its products, and outranks Somerset in the value of its oyster catch, but is exceeded by the latter in the catch of soft crabs. Talbot County ranks third in importance, with a more valuable hard-crab industry than exists in any other county. These crabs are utilized mostly at factories located at Oxford and vicinity, St. Michaels, and Tilghman Island, where the meat is picked from the crabs and shipped in tin buckets. Anne Arundel County's oyster and crab industries place it fourth in importance, and Annapolis is the center of both of these industries. Worcester, the only county bordering on the ocean, supports extensive pound-net and sturgeon gill-net fisheries, which, with its oyster-planting industry, contribute very largely to the value of its products. St. Mary County owes its position as sixth in rank almost entirely to its oyster industry, the other fisheries being comparatively unimportant. The same may be said of Wicomico County, with the exception that the gill-net fishery for shad is of considerable value. Kent County supports the most important gill-net fishery in the state, the greater part being carried on from Betterton, in Chesapeake Bay. It supports also important seine and pound-net fisheries. Calvert County,

besides its important oyster industry, has profitable pound-net fisheries. The products of Queen Anne County consist mainly of oysters, hard crabs, and striped bass. The oyster product is taken entirely with tongs. Baltimore City supports a very important vessel fishery for oysters, though there were in 1904 but little more than one-third as many vessels from that port as in 1901. Baltimore County (including Baltimore City) ranks first in the amount of investment and number of persons employed, because of its oyster canning and shucking trade. Charles is the only one of the remaining counties in which oysters are taken. Cecil County ranks first in the value of pound-net fisheries, followed by Worcester, Charles, Dorchester, and Talbot counties. Shad and alewives constitute the main catch of these nets. In Harford County these two species are taken mostly in seines. The salting of alewives is an important industry in both Cecil and Harford counties. The fisheries of Caroline County have decreased in value from $22,012 in 1897 to $1,571 in 1904, mainly on account of the diminished number of shad ascending the Choptank River.

STATEMENT, BY COUNTIES, OF THE NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF MARYLAND IN 1904.

Counties.	On vessels fishing.	On vessels transporting.	In shore or boat fisheries.	Shoresmen.	Total.
Anne Arundel	49	156	1,935	191	2,331
Baltimore[a]	447	387	53	5,559	6,446
Calvert	173	63	821	9	1,066
Caroline			33		33
Cecil		2	351	65	418
Charles		3	490	23	516
Dorchester	1,421	203	2,199	1,114	4,937
Harford		4	517	214	735
Kent	60	63	871		994
Prince George			99	3	102
Queen Anne		10	625		635
St. Mary	10	84	1,277	48	1,419
Somerset	1,676	240	2,224	1,856	5,996
Talbot	426	64	1,353	1,030	2,873
Wicomico	28	49	888	160	1,125
Worcester		39	661	11	711
Total	4,290	1,367	14,397	10,283	30,337

[a] Includes Baltimore City.

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, SHORE PROPERTY, AND CASH CAPITAL EMPLOYED IN THE FISHERIES OF MARYLAND IN 1904.

Items.	Anne Arundel.		Baltimore. [a]		Calvert.		Caroline.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	10	$7,050	54	$26,350	35	$43,055		
Tonnage	116		1,373		315			
Outfit		2,073		16,740		5,550		
Vessels transporting	58	41,750	107	99,425	20	15,700		
Tonnage	885		4,157		501			
Outfit		8,073		21,812		3,385		
Boats, sail and row	169	2,792	25	705	568	41,435	17	$160
Boats, gasoline	3	1,450	1	500	2	2,400		
Apparatus—vessel fisheries:								
Oyster dredges	24	406	212	2,330	114	1,710		
Tongs	6	27			42	441		
Apparatus—shore fisheries:								
Seines	76	1,551	4	700	7	585	1	225
Gill nets	24	299	5	50	55	140	57	602
Pound nets	41	4,450	3	55	65	6,085	9	390
Fyke nets			372	2,217			34	320
Trammel nets	2	60						
Minor apparatus		34		40		45		
Lines		452				18		
Eel pots			23	12	45	42		
Oyster dredges					16	240		
Tongs and nippers	1,338	6,690			1,044	10,962		
Shore and accessory property		15,335		1,376,759		1,562		200
Cash capital		12,500		1,989,200		20,900		
Total		104,992		3,536,895		154,255		1,897

Items.	Cecil.		Charles.		Dorchester.		Harford.		Kent.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing					272	$114,600			8	$3,600
Tonnage					2,049				153	
Outfit						27,425				1,805
Vessels transporting	1	$300	1	$600	59	84,400	2	$450	30	16,500
Tonnage	12		8		1,703		14		473	
Outfit		45		125		10,715		75		3,551
Boats, sail and row	158	8,015	268	13,990	1,749	87,000	154	9,115	531	25,830
Boats, gasoline	7	2,650			4	1,750	7	2,525	8	2,470
Apparatus—vessel fisheries:										
Oyster dredges					1,080	18,810			16	240
Crab scrapes					64	204				
Tongs					6	30				
Seines									7	1,250
Eel pots					1,731	1,036				
Apparatus—shore fisheries:										
Seines	4	597	7	930	14	963	11	7,050	14	1,770
Gill nets	492	7,701	108	3,628	215	1,294	663	9,119	927	7,095
Pound nets	180	12,400	121	13,835	214	14,860	11	300	64	5,775
Fyke nets	2,044	3,657	2	50	30	330	2,074	3,365	159	2,455
Trammel nets	5	150					8	1,200		
Minor apparatus						96				
Lines				52		1,176				293
Eel pots	250	100	36	32	388	250	274	169	255	142
Oyster dredges			7	35	878	7,862				
Crab scrapes					254	793				
Tongs and nippers			282	1,432	2,136	10,392			778	3,961
Shore and accessory property		10,658		4,357		67,310		30,010		2,236
Cash capital		2,000		600		51,100		3,000		
Total		48,273		39,666		502,396		66,378		78,973

[a] Includes Baltimore City.

Statement, by Counties, of the Vessels, Boats, Apparatus, Shore Property, and Cash Capital Employed in the Fisheries of Maryland in 1904—Cont'd.

Items.	Prince George.		Queen Anne.		St. Mary.		Somerset.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing					2	$900	303	$191,275
Tonnage					20		2,777	
Outfit						375		44,805
Vessels transporting			4	$2,200	28	21,000	76	109,400
Tonnage			93		429		1,955	
Outfit				525		4,100		11,890
Boats, sail and row	34	$1,230	426	15,280	911	49,920	2,313	121,870
Apparatus—vessel fisheries:								
Oyster dredges					8	160	1,204	21,060
Crab scrapes							103	338
Seines							3	3,000
Apparatus—shore fisheries:								
Seines	8	2,550	17	945	5	535		
Gill nets	14	1,052	120	435			53	441
Pound nets	2	200	16	800	44	6,825	35	1,560
Fyke nets			29	270			54	658
Bow nets							21	105
Minor apparatus								511
Lines		2		445		177		421
Eel pots			200	85			75	65
Spears							28	35
Oyster dredges					44	224	1,178	12,495
Crab scrapes							2,234	7,265
Tongs and nippers			544	2,720	1,019	7,115	1,164	5,637
Shore and accessory property		5,858		493		2,248		200,885
Cash capital						3,000		169,200
Total		10,892		24,198		96,579		902,916

Items.	Talbot.		Wicomico.		Worcester.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	88	$33,800	5	$2,500			777	$423,130
Tonnage	673		52				7,528	
Outfit		16,255		440				115,468
Vessels transporting	21	25,650	17	19,825	14	$16,300	438	453,500
Tonnage	555		391		287		11,463	
Outfit		3,090		2,280		1,495		71,161
Boats, sail and row	909	40,523	572	20,560	428	12,531	9,232	450,956
Boats, gasoline	4	2,375	1	300	7	3,475	44	19,895
Apparatus—vessel fisheries:								
Oyster dredges	352	8,890	20	375			3,030	53,981
Crab scrapes							167	542
Tongs							54	498
Seines							10	4,250
Eel pots							1,731	1,036
Apparatus—shore fisheries:								
Seines	3	105	2	100	51	575	224	19,181
Gill nets	41	305	435	3,502	626	10,086	3,835	45,749
Pound nets	133	13,480	17	2,100	8	15,205	963	98,320
Fyke nets	18	280	188	1,712			5,004	15,314
Trammel nets							15	1,410
Bow nets			19	82	63	315	103	502
Minor apparatus				1				727
Lines		2,526		661		34		6,257
Eel pots	150	65			1,100	443	2,796	1,405
Spears					11	10	39	45
Oyster dredges							2,123	20,856
Crab scrapes							2,488	8,058
Tongs and nippers	840	4,210	705	3,525	218	1,085	10,068	57,729
Shore and accessory property		57,274		6,265		17,395		1,798,845
Cash capital		52,650		10,500				2,314,650
Total		261,478		74,728		78,949		5,983,465

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF MARYLAND IN 1904.

Species.	Anne Arundel.		Baltimore.[a]		Calvert.		Caroline.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	296,000	$3,100	55,600	$345	767,400	$6,497	11,640	$153
Alewives, salted			1,120	21	320,000	5,000		
Black bass			850	85				
Bluefish	17,100	976			1,100	96		
Butterfish					1,500	75		
Carp	49,900	1,854	100	2	12,700	409	1,050	22
Catfish	23,350	863	9,400	286	18,300	784	1,250	40
Eels, fresh	2,750	130	700	41	5,000	223		
Flounders	100	6			2,500	125		
Mullet			900	20				
Perch, white	33,950	2,193	26,000	1,060	18,800	1,103	5,700	265
Perch, yellow	26,150	1,489	30,500	1,145	4,000	204	1,050	33
Pike	10,750	920	2,650	270	200	24		
Shad	42,280	2,981			110,508	6,303	15,000	842
Spot	500	10						
Squeteague	325	16			2,700	105		
Striped bass	82,100	7,732	24,500	940	40,600	4,274	2,200	216
Sturgeon	450	18			700	54		
Caviar					80	64		
Sunfish	4,500	390						
Crabs, hard	1,230,500	13,179			40,625	487		
Crabs, soft	127,200	12,720			60,000	5,250		
Shrimp			2,400	800				
Oysters, market, natural rock	3,582,250	257,377	880,950	85,944	1,065,050	114,689		
Turtles					700	28		
Total	5,530,155	305,954	1,035,670	90,959	2,472,463	145,794	37,890	1,571

Species.	Cecil.		Charles.		Dorchester.		Harford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	1,934,000	$7,923	1,614,000	$8,193	675,220	$5,805	480,000	$3,445
Alewives, salted	2,076,000	31,315	217,920	4,086	500	10	2,224,000	41,625
Black bass			10,300	940			1,000	100
Bluefish			14,550	725	35,890	947		
Butterfish					1,400	35		
Carp	18,500	662	11,700	290	6,530	215	18,500	478
Catfish	90,600	2,794	81,925	3,390	56,915	2,032	77,500	3,013
Croaker					61,720	1,049		
Drum					4,230	49		
Eels, fresh	7,600	320	4,500	178	125,410	4,721	13,600	547
Eels, salted					75,900	2,204		
Flounders			8,900	267	405	18		
Gar pike					4,000	10		
Gizzard shad					6,825	126		
Mullet					7,560	191	650	15
Perch, white	54,900	3,006	87,100	4,769	30,693	1,586	58,725	3,918
Perch, yellow	33,300	1,164	22,450	733	23,670	1,103	36,550	1,460
Pike	2,500	250	5,700	355	8,605	795	4,610	512
Shad	594,540	27,584	207,400	11,988	224,475	15,267	557,412	26,318
Spanish mackerel					230	35		
Spot					1,150	46		
Squeteague			22,900	916	3,700	185		
Striped bass	15,100	1,844	89,250	8,232	38,680	3,013	77,300	9,351
Sturgeon			1,955	155	4,000	240		
Caviar			465	303	118	37		
Suckers			2,775	72				
Sunfish			900	36	1,250	25		
Crabs, hard			208,300	3,125	1,318,200	19,628		
Crabs, soft			4,000	300	435,699	11,990		
Oysters, market, natural rock			340,550	23,257	6,689,620	487,894		
Oysters, market, private beds					408,030	35,040		
Terrapin					3,018	1,756		
Total	4,827,040	76,862	2,957,540	72,310	10,253,643	596,052	3,549,847	90,782

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF MARYLAND IN 1904—Continued.

Species.	Kent.		Prince George.		Queen Anne.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	773,200	$2,917	834,000	$3,410	240,800	$1,150
Alewives, salted	32,000	400	24,000	262		
Black bass			2,000	200		
Bluefish	400	16				
Carp	2,550	75	12,800	479	700	21
Catfish	30,375	918	16,900	587	8,250	282
Eels, fresh	24,150	964	850	28	10,800	432
Mullet			2,870	60	700	18
Perch, white	100,750	5,551	5,680	288	11,400	648
Perch, yellow	47,550	1,677	8,875	328	9,900	497
Pike	1,200	120	1,000	94	850	87
Shad	560,260	33,781	65,527	3,670	5,620	366
Spot	950	25				
Striped bass	202,250	20,352	3,670	356	50,250	5,565
Crabs, hard	556,250	4,456			912,500	6,376
Crabs, soft	44,000	4,400			12,000	900
Oysters, market, natural rock	1,022,700	72,526			1,259,650	89,965
Turtles			2,800	28		
Total	3,398,585	148,178	980,972	9,790	2,523,420	106,307

Species.	St. Mary.		Somerset.		Talbot.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	618,000	$2,279	41,450	$651	1,045,600	$6,988
Bluefish	4,600	230	2,740	111	1,000	50
Carp	800	24	150	3	3,200	96
Catfish	500	15	14,300	614	11,350	334
Croaker	2,500	102	13,400	109	8,500	180
Drum			5,600	100		
Eels, fresh			11,875	717	1,500	75
Eels, salted			400	10		
Flounders	1,850	49	7,930	270	2,050	98
Gizzard shad					400	10
Hickory shad	4,500	90				
Menhaden			9,325,300	19,424		
Mullet					100	2
Perch, white	6,900	345	6,960	477	19,700	954
Perch, yellow			400	16	19,050	761
Pike			450	41	100	10
Shad	26,550	1,445	40,120	2,403	280,412	14,120
Spanish mackerel			45	5		
Spot	800	48	900	24	4,480	117
Squeteague	28,300	1,213	32,550	594		
Striped bass	36,200	3,620	5,760	503	24,300	2,261
Crabs, hard	270,083	3,585	870,849	11,075	7,031,250	105,132
Crabs, soft	3,400	180	5,026,566	152,111	20,000	2,000
Oysters, market, natural rock	2,347,275	178,547	5,036,185	439,515	3,746,715	265,262
Oysters, market, private beds			1,054,305	91,434	47,600	6,272
Oysters, seed, natural rock			641,445	14,737		
Clams, hard			5,000	850		
Turtles			800	34		
Terrapin			675	800		
Total	3,352,258	191,772	22,146,155	736,628	12,267,307	404,722

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FISHERIES OF MARYLAND IN 1904—Continued.

Species.	Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	73,080	$868	129,440	$1,539	9,589,430	$55,263
Alewives, salted					4,895,540	82,719
Black bass					14,150	1,325
Bluefish			14,080	704	91,460	3,855
Bonito			3,150	102	3,150	102
Butterfish			372,162	9,780	375,062	9,890
Carp	100	3			139,280	4,633
Catfish	49,670	2,395	850	34	491,435	18,381
Cero			5,130	156	5,130	156
Cod			310	12	310	12
Croaker			79,720	1,248	165,840	2,688
Drum			21,145	152	30,975	301
Eels, fresh	100	7	41,330	2,322	250,165	10,705
Eels, salted					76,300	2,214
Flounders			11,270	359	35,005	1,192
Gar pike					4,000	10
Gizzard shad					7,225	136
Hickory shad					4,500	90
Kingfish			7,610	940	7,610	940
Mackerel			16,240	1,296	16,240	1,296
Menhaden			524,100	765	9,849,400	20,189
Mullet	975	26	11,180	413	24,935	745
Perch, white	17,365	1,018	60,430	3,660	545,053	30,841
Perch, yellow	2,025	75			265,470	10,685
Pike	602	52	3,100	186	42,317	3,716
Pompano			300	45	300	45
Scup			31,610	2,558	31,610	2,558
Sea bass			59,600	2,580	59,600	2,580
Shad	136,125	9,879	46,020	2,825	2,912,249	159,772
Sheepshead			950	68	950	68
Spanish mackerel			1,675	201	1,950	241
Spot			4,700	141	13,480	411
Squeteague			694,740	20,178	785,215	23,207
Striped bass	7,500	731	21,580	3,217	721,240	72,207
Sturgeon	1,600	85	155,540	7,761	164,245	8,313
Caviar	250	217	19,687	18,101	20,600	18,722
Suckers					2,775	72
Sunfish			800	36	7,450	487
Crabs, hard	222,925	1,910	3,800	43	[b] 12,665,282	168,996
Crabs, soft					[c] 5,732,865	189,851
Shrimp					2,400	800
Squid			14,000	418	14,000	418
Oysters, market, natural rock	1,033,305	81,171	28,700	2,845	[d] 27,032,950	2,098,992
Oysters, market, private beds	804,510	58,440	937,510	110,464	[e] 3,251,955	301,650
Oysters, seed, natural rock	56,000	1,200	25,200	1,095	[f] 722,645	17,032
Clams, hard			32,800	4,030	[g] 37,800	4,880
Turtles	9,100	366			13,400	456
Terrapin			230	162	3,923	2,718
Total	2,415,232	158,443	3,380,689	200,436	81,128,866	3,336,560

[a] Includes Baltimore City.
[b] 37,995,846 in number.
[c] 17,198,595 in number.
[d] 3,861,850 bushels.
[e] 464,565 bushels.
[f] 103,235 bushels.
[g] 4,725 bushels.

THE PRODUCTS BY APPARATUS.

The most important forms of apparatus used in the fisheries are tongs, dredges, and scrapes. The catch by tongs (including a few oysters taken with nippers) in 1904 was valued at $1,593,554, while that taken with dredges and scrapes was worth $953,295. The latter represents the value of both oysters and crabs. Pound nets ranked third, with a catch valued at $220,852, followed by lines, gill nets, and seines. The principal species taken on lines are crabs; in gill nets, shad, sturgeon, and striped bass; and in seines, alewives, striped bass, and menhaden. The remainder of the catch was taken with fyke-nets, eel pots, trammel nets, bow nets, spears, and minor apparatus, including scoop nets, which are used mainly for catching soft crabs.

STATEMENT, BY COUNTIES, OF THE CATCH BY TONGS AND NIPPERS IN MARYLAND IN 1904.

Species.	Anne Arundel.		Calvert.		Charles.		Dorchester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market—								
Natural rock	6,300	$502	32,200	$3,555	....	....	7,000	$450
Shore fisheries:								
Oysters, market—								
Natural rock	3,491,250	249,375	817,950	87,649	316,050	$21,682	3,333,155	233,825
Private beds	....	....	....	....	....	....	408,030	35,040
Total	3,491,250	249,375	817,950	87,649	316,050	21,682	3,741,185	268,865
Grand total	3,497,550	249,877	850,150	91,204	316,050	21,682	3,748,185	269,315

Species.	Kent.		Queen Anne.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Oysters, market—								
Natural rock	973,700	$67,491	1,259,650	$89,965	2,260,825	$172,192	1,026,900	$94,965
Private beds	....	....	....	....	....	....	1,054,305	91,434
Clams, hard	....	....	....	....	....	....	5,000	850
Total	973,700	67,491	1,259,650	89,965	2,260,825	172,192	2,086,205	187,249

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market—								
Natural rock	....	....	....	....	....	....	45,500	$4,507
Shore fisheries:								
Oysters, market—								
Natural rock	2,592,065	$182,012	1,010,905	$79,421	28,700	$2,845	17,111,150	1,281,422
Private beds	47,600	6,272	804,510	58,440	937,510	110,464	3,251,955	301,650
Oysters, seed—								
Natural rock	....	....	....	....	25,200	1,095	25,200	1,095
Clams, hard	....	....	....	....	32,800	4,030	37,800	4,880
Total	2,639,665	188,284	1,815,415	137,861	1,024,210	118,434	20,426,105	1,589,047
Grand total	2,639,665	188,284	1,815,415	137,861	1,024,210	118,434	20,471,605	1,593,554

STATEMENT, BY COUNTIES, OF THE CATCH BY DREDGES AND SCRAPES IN MARYLAND IN 1904.

Species.	Anne Arundel.		Baltimore.		Calvert.		Charles.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market, natural rock	84,700	$7,500	880,950	$85,944	191,100	$20,835		
Total	84,700	7,500	880,950	85,944	191,100	20,835		
Shore fisheries:								
Oysters, market, natural rock					23,800	2,650	24,500	$1,575
Total					23,800	2,650	24,500	1,575
Grand total	84,700	7,500	880,950	85,944	214,900	23,485	24,500	1,575

Species.	Dorchester.		Kent.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Oysters, market, natural rock	a 2,332,995	$176,576	49,000	$5,035	36,050	$2,575	2,749,390	$233,970
Oysters, seed, natural rock							635,600	14,612
Crabs, soft	43,933	1,200					188,066	4,935
Total	2,376,928	177,776	49,000	5,035	36,050	2,575	3,573,056	253,517
Shore fisheries:								
Oysters, market, natural rock	1,016,470	77,043			50,400	3,780	1,259,895	110,580
Oysters, seed, natural rock							5,845	125
Crabs, hard							486,666	5,555
Crabs, soft	178,833	5,250					3,527,643	107,355
Total	1,195,303	82,293			50,400	3,780	5,280,049	223,615
Grand total	3,572,231	260,069	49,000	5,035	86,450	6,355	8,853,105	477,132

Species.	Talbot.		Wicomico.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Oysters, market, natural rock	1,154,650	$83,250	22,400	$1,750	7,501,235	$617,435
Oysters, seed, natural rock			56,000	1,200	691,600	15,812
Crabs, soft					231,999	6,135
Total	1,154,650	83,250	78,400	2,950	8,424,834	639,382
Shore fisheries:						
Oysters, market, natural rock					2,375,065	195,628
Oysters, seed, natural rock					5,845	125
Crabs, hard					486,666	5,555
Crabs, soft					3,706,476	112,605
Total					6,574,052	313,913
Grand total	1,154,650	83,250	78,400	2,950	14,998,886	953,295

a Includes 2,800 pounds valued at $220, from private beds.

STATEMENT, BY COUNTIES, OF THE POUND-NET CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904.

Species.	Anne Arundel.		Baltimore.		Calvert.		Caroline.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	276,000	$2,850	21,600	$135	727,400	$6,193	4,600	$66
Alewives, salted					320,000	5,000		
Bluefish	100	6			1,100	96		
Butterfish					1,500	75		
Carp	1,500	45			6,600	210		
Catfish					8,400	360	650	26
Eels, fresh	500	20			500	40		
Flounders	100	6			2,500	125		
Perch, white	16,450	948			11,500	671	2,500	125
Perch, yellow	3,750	210	1,000	35	1,600	84	550	16
Shad	30,680	2,256			102,048	5,725	1,400	87
Squeteague	75	6			2,700	105		
Striped bass	41,600	3,842			23,600	2,936	2,100	210
Sturgeon	450	18			700	54		
Caviar					80	64		
Total	371,205	10,207	22,600	170	1,210,228	21,738	11,800	530

Species.	Cecil.		Charles.		Dorchester.		Harford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value
Alewives, fresh	1,934,000	$7,923	1,238,000	$7,059	669,220	$5,730	2,000	$10
Alewives, salted	2,076,000	31,315			500	10		
Black bass			1,500	120				
Bluefish			14,550	725	790	42		
Butterfish					1,400	35		
Carp			6,100	157	6,460	213		
Catfish	14,000	400	66,800	2,774	41,475	1,423		
Croaker					61,720	1,049		
Drum					4,230	49		
Eels, fresh			500	18	700	33		
Flounders			8,900	267	405	18		
Gar pike					4,000	10		
Gizzard shad					6,825	126		
Mullet					6,210	164		
Perch, white	27,300	1,385	76,700	4,200	19,365	948	1,800	108
Perch, yellow	10,800	324	15,600	518	14,095	615	1,800	90
Pike			3,100	155	7,480	673		
Shad	102,800	4,582	51,900	3,225	196,275	12,956		
Spot					250	10		
Squeteague			22,900	916	2,700	110		
Striped bass	6,500	650	76,750	7,180	25,280	1,843		
Sturgeon					4,000	240		
Caviar					118	37		
Suckers			175	4				
Total	4,171,400	46,579	1,583,475	27,318	1,073,498	26,334	5,600	208

Species.	Kent.		Prince George.		Queen Anne.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	748,400	$2,729	30,000	$150	196,000	$1,015	618,000	$2,279	28,900	$505
Alewives, salted	32,000	400								
Bluefish	400	16					3,100	155	260	14
Carp							800	24	150	3
Catfish	7,750	250	400	20	600	18			3,775	105
Croaker							1,900	72	13,400	109
Drum									4,700	70
Eels, fresh	2,000	100							775	22
Flounders							1,500	40	7,930	270
Hickory shad							4,500	90		
Menhaden									4,000	5
Perch, white	40,050	2,229	500	25	4,800	240	1,600	80	2,485	179
Perch, yellow	5,100	174	200	6	1,300	39				
Pike	50	5								
Shad	31,960	1,927	800	40	4,100	266	26,550	1,445	16,070	897
Spot							800	48	100	4
Squeteague							17,800	732	12,550	228
Striped bass	46,500	4,070	300	24	6,000	560	21,500	2,150	2,350	213
Total	914,210	11,900	32,200	265	212,800	2,138	698,050	7,115	97,445	2,624

STATEMENT, BY COUNTIES, OF THE POUND-NET CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904—Continued.

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	1,045,600	$6,988	62,800	$735	16,630	$241	7,610,150	$44,608
Alewives, salted							2,428,500	56,725
Black bass							1,500	120
Bluefish					4,480	224	24,780	1,278
Bonito					3,150	102	3,150	102
Butterfish					372,162	9,780	375,062	9,890
Carp	100	3					21,710	655
Catfish	8,050	236	7,070	215			158,970	5,827
Cero					5,130	156	5,130	156
Cod					310	12	310	12
Croaker	8,500	180			68,460	1,072	153,980	2,482
Drum					21,145	152	30,075	271
Eels, fresh							4,975	233
Flounders	2,050	98			9,870	303	33,255	1,127
Gar pike							4,000	10
Gizzard shad							6,825	126
Hickory shad							4,500	90
Kingfish					7,130	875	7,130	875
Mackerel					16,240	1,296	16,240	1,296
Menhaden							4,000	5
Mullet	100	2	150	6			6,460	172
Perch, white	17,500	827	2,360	130			224,910	12,095
Perch, yellow	5,950	178	270	8			62,015	2,297
Pike			30	3			10,660	836
Pompano					300	45	300	45
Scup					30,410	2,510	30,410	2,510
Shad	279,212	14,030	19,750	1,570	4,960	402	868,505	49,408
Sheepshead					950	68	950	68
Spanish mackerel					1,675	201	1,675	201
Spot	4,480	117			4,700	141	10,330	320
Squeteague					632,420	18,340	691,145	20,437
Squid					14,000	418	14,000	418
Striped bass	20,750	1,901	370	33			273,600	25,612
Sturgeon					1,830	92	6,580	404
Caviar							198	101
Suckers							175	4
Sunfish					800	36	800	36
Total	1,392,292	24,560	92,800	2,700	1,216,752	36,466	13,106,355	220,852

STATEMENT, BY COUNTIES, OF THE LINE CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904.

Species.	Anne Arundel.		Calvert.		Charles.		Dorchester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Catfish							4,500	$225
Crabs, hard	1,230,500	$13,179	40,625	$487	208,300	$3,125	1,318,200	19,628
Crabs, soft	6,000	600					64,500	1,400
Turtles			700	28				
Total	1,236,500	13,779	41,325	515	208,300	3,125	1,387,200	21,253

Species.	Kent.		Prince George.		Queen Anne.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Bluefish									80	$2
Catfish									4,550	248
Drum									900	30
Perch, white									400	10
Spot									800	20
Squeteague									19,700	353
Crabs, hard	556,250	$4,456			912,500	$6,376	270,083	$3,585	384,183	5,520
Crabs, soft	44,000	4,400								
Turtles			2,800	$28					350	14
Total	600,250	8,856	2,800	28	912,500	6,376	270,083	3,585	410,963	6,197

STATEMENT, BY COUNTIES, OF THE LINE CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904—Continued.

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Bluefish					9,600	$480	9,680	$482
Catfish			28,050	$1,520			37,100	1,993
Croaker					10,000	138	10,000	138
Drum							900	30
Flounders					1,400	56	1,400	56
Perch, white			450	40			850	50
Scup					1,200	48	1,200	48
Sea bass					59,600	2,580	59,600	2,580
Spot							800	20
Squeteague					46,720	1,260	66,420	1,613
Crabs, hard	7,031,250	$105,132	222,925	1,910	3,800	43	[a] 12,178,616	163,441
Crabs, soft	20,000	2,000					[b] 134,500	8,400
Turtles			6,600	266			10,450	336
Total	7,051,250	107,132	258,025	3,736	132,320	4,605	12,511,516	179,187

[a] 36,535,848 in number.

[b] 403,500 in number.

STATEMENT, BY COUNTIES, OF THE GILL-NET CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904.

Species.	Anne Arundel.		Baltimore.		Calvert.		Caroline.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	16,000	$200			2,000	$19	4,640	$54
Bluefish	10,000	600						
Perch, white	250	25	500	$40	1,200	51		
Perch, yellow	300	12						
Pike	100	10						
Shad	9,600	600			4,460	278	11,600	640
Striped bass	500	50	1,500	120	2,700	202		
Total	36,750	1,497	2,000	160	10,360	550	16,240	694

Species.	Cecil.		Charles.		Dorchester.		Harford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh			73,600	$378	6,000	$75		
Bluefish					34,600	865		
Carp							1,500	$45
Perch, white					100	5	600	48
Perch, yellow					50	2		
Pike					100	8	300	24
Shad	491,740	$23,002	138,000	7,263	28,200	2,311	484,612	22,263
Spanish mackerel					230	35		
Striped bass	3,000	254	4,000	320			52,400	6,320
Sturgeon			1,955	155				
Caviar			465	303				
Total	494,740	23,256	218,020	8,419	69,280	3,301	539,412	28,700

Species.	Kent.		Prince George.		Queen Anne.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	7,000	$92			4,800	$35		
Bluefish							2,400	$95
Carp	1,200	36						
Catfish	1,000	30			100	3		
Mullet					150	3		
Perch, white	24,950	1,037			100	5		
Perch, yellow	900	27			800	48		
Pike	500	50			50	5		
Shad	525,500	31,679	44,700	$2,250	1,120	80	10,250	725
Spanish mackerel							45	5
Striped bass	31,050	4,064			4,900	470		
Total	592,100	37,015	44,700	2,250	12,020	649	12,695	825

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STATEMENT, BY COUNTIES, OF THE GILL-NET CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904—Continued.

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh					24,640	$285	138,680	$1,138
Bluefish	1,000	$50					48,000	1,610
Carp							2,700	81
Catfish	100	3	100	$3			1,300	39
Gizzard shad	400	10					400	10
Kingfish					480	65	480	65
Mullet			100	2	10,030	360	10,280	365
Perch, white	600	45	2,820	148	23,120	1,399	54,240	2,803
Perch, yellow	100	3	100	3			2,250	95
Pike	100	10	85	9			1,235	116
Shad	1,200	90	114,000	8,130	4,740	285	1,869,722	99,596
Spanish mackerel							275	40
Squeteague					1,250	52	1,250	52
Striped bass	500	54			8,280	1,229	108,830	13,083
Sturgeon			1,600	85	153,710	7,669	157,265	7,909
Caviar			250	217	19,687	18,101	20,402	18,621
Total	4,000	265	119,055	8,597	245,937	29,445	2,417,309	145,623

STATEMENT, BY COUNTIES, OF THE SEINE CATCH OF MARYLAND IN 1904.

Species.	Anne Arundel.		Baltimore.		Calvert.		Caroline.		Cecil.	
	Lbs.	Value.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
Shore fisheries:										
Alewives, fresh	4,000	$50	32,000	$200	38,000	$285	1,200	$18		
Bluefish	7,000	370								
Carp	48,400	1,809			6,100	199	500	10	18,500	$662
Catfish	23,250	855			9,960	424				
Eels, fresh	2,250	110			300	15				
Perch, white	17,250	1,220	6,500	260	6,100	381	1,000	30		
Perch, yellow	20,100	1,067	3,500	140	2,400	120				
Pike	8,650	710			200	24				
Shad	2,000	125			4,000	300	1,200	75		
Spot	500	10								
Squeteague	250	10								
Striped bass	40,000	3,840	22,000	760	14,300	1,136	100	6	2,500	500
Sunfish	3,500	310								
Crabs, soft	28,400	2,840								
Total	205,550	13,326	64,000	1,360	81,300	2,884	4,000	139	21,000	1,162

Species.	Charles.		Dorchester.		Harford.		Kent.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Perch, white							13,000	$1,130
Striped bass							101,000	10,230
Total							114,000	11,360
Shore fisheries:								
Alewives, fresh	302,400	$756			474,000	$3,405	2,400	15
Alewives, salted	217,920	4,086			2,224,000	41,625		
Black bass	8,800	820			600	60		
Bluefish			500	$40				
Carp	5,400	129			6,000	180	1,150	33
Catfish	11,925	456	7,200	240	8,500	420	8,750	262
Eels, fresh							1,550	58
Perch, white	8,900	494	10,600	600	24,800	1,774	9,950	508
Perch, yellow	6,300	200	8,800	460	20,500	800	3,350	112
Pike	2,600	200	800	96	250	30	50	5
Shad	17,500	1,500			72,800	4,055	2,800	175
Spot			900	36			950	25
Squeteague			1,000	75				
Striped bass	7,700	700	13,000	1,135	6,000	600	20,650	1,707
Suckers	2,600	68						
Sunfish	900	36	1,250	25				
Terrapin			2,934	1,698				
Total	592,945	9,445	46,984	4,405	2,837,450	52,949	51,600	2,900
Grand total	592,945	9,445	46,984	4,405	2,837,450	52,949	165,600	14,260

STATEMENT, BY COUNTIES, OF THE SEINE CATCH OF MARYLAND IN 1904—Cont'd.

Species.	Prince George.		Queen Anne.		St. Mary.		Somerset.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Menhaden							9,321,300	$19,419
Total							9,321,300	19,419
Shore fisheries:								
Alewives, fresh	804,000	$3,260	40,000	$100				
Alewives, salted	24,000	262						
Black bass	2,000	200						
Bluefish					1,500	$75		
Carp	12,800	479	200	6				
Catfish	16,500	567	5,650	204	500	15		
Croaker					600	30		
Eels, fresh	850	28						
Flounders					350	9		
Mullet	2,870	60						
Perch, white	5,180	263	4,800	330	5,300	265		
Perch, yellow	8,675	322	5,900	347				
Pike	1,000	94	350	35				
Shad	20,027	1,380	400	20				
Squeteague					10,500	481		
Striped bass	3,370	332	39,000	4,500	14,700	1,470		
Crabs, soft			12,000	900				
Total	901,272	7,247	108,300	6,442	33,450	2,345		
Grand total	901,272	7,247	108,300	6,442	33,450	2,345	9,321,300	19,419

Species.	Talbot.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Menhaden							9,321,300	$19,419
Perch, white							13,000	1,130
Striped bass							101,000	10,230
Total							9,435,300	30,779
Shore fisheries:								
Alewives, fresh			120	$3	88,170	$1,013	1,786,290	9,105
Alewives, salted							2,465,920	45,973
Black bass							11,400	1,080
Bluefish							9,000	485
Carp	2,400	$72					101,450	3,579
Catfish	1,100	33	1,000	25	850	34	95,125	3,535
Croaker					1,260	38	1,860	68
Eels, fresh							4,950	211
Flounders							350	9
Menhaden					524,100	765	524,100	765
Mullet					1,150	53	4,020	113
Perch, white	700	37	500	25	37,310	2,261	138,890	8,448
Perch, yellow	7,000	280					86,525	3,848
Pike					3,100	186	17,000	1,380
Shad			1,100	72	4,420	279	126,247	7,981
Spot							2,350	71
Squeteague					14,350	526	26,100	1,092
Striped bass	2,200	220	250	26	13,300	1,988	199,070	18,920
Suckers							2,600	68
Sunfish							5,650	371
Crabs, soft							40,400	3,740
Terrapin							2,934	1,698
Total	13,400	642	2,970	151	688,010	7,143	5,652,231	112,540
Grand total	13,400	642	2,970	151	688,010	7,143	15,087,531	143,319

STATEMENT, BY COUNTIES, OF THE FYKE-NET CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904.

Species.	Baltimore.		Caroline.		Cecil.		Charles.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	2,000	$10	1,200	$15				
Alewives, salted	1,120	21						
Black bass	850	85						
Carp	100	2	550	12			200	$4
Catfish	9,400	286	600	14	73,600	$2,304	3,200	160
Eels, fresh	500	35			3,600	190		
Mullet	900	20						
Perch, white	19,000	760	2,200	110	25,100	1,496	1,500	75
Perch, yellow	26,000	970	500	17	21,500	810	550	15
Pike	2,650	270			1,000	100		
Shad			800	40				
Striped bass	1,000	60			2,100	315	800	32
Total	63,520	2,519	5,850	208	126,900	5,215	6,250	286

Species.	Dorchester.		Harford.		Kent.		Queen Anne.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh			4,000	$30	15,400	$81		
Black bass			400	40				
Carp	70	$2	5,000	120	200	6	500	$15
Catfish	3,740	144	67,500	2,511	12,875	376	1,900	57
Eels, fresh	160	5	9,200	321	4,300	174	600	24
Mullet	1,350	27	450	11			550	15
Perch, white	628	33	30,925	1,952	12,800	647	1,700	73
Perch, yellow	725	26	14,250	570	38,200	1,364	1,900	63
Pike	225	18	3,560	408	600	60	450	47
Striped bass	400	35			3,050	281	350	35
Terrapin	84	58						
Total	7,382	348	135,285	5,963	87,425	2,989	7,950	329

Species.	Somerset.		Talbot.		Wicomico.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	12,550	$146			10,160	$130	45,310	$412
Alewives, salted							1,120	21
Black bass							1,250	125
Carp			700	$21	100	3	7,420	185
Catfish	5,875	256	2,100	62	12,000	559	192,790	6,729
Eels, fresh					100	7	18,460	756
Eels, salted	400	10					400	10
Mullet					725	18	3,975	91
Perch, white	3,925	278	900	45	8,285	483	106,963	5,952
Perch, yellow	400	16	6,000	300	1,655	64	111,680	4,215
Pike	450	41			487	40	9,422	984
Shad	4,800	181			1,275	107	6,875	328
Squeteague	300	13					300	13
Striped bass	3,360	284	850	86	5,630	546	17,540	1,674
Terrapin							84	58
Turtles	450	20			2,500	100	2,950	120
Total	32,510	1,245	10,550	514	42,917	2,057	526,539	21,673

STATEMENT, BY COUNTIES, OF THE CATCH OF EELS, BY POTS AND SPEARS, IN MARYLAND IN 1904.

Counties.	Eels, fresh.		Eels, salted.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Dorchester	111,300	$4,113	67,400	$2,005	178,700	$6,118
Shore fisheries:						
Baltimore	200	6			200	6
Calvert	4,200	168			4,200	168
Cecil	4,000	130			4,000	130
Charles	4,000	160			4,000	160
Dorchester	13,250	570	8,500	199	21,750	769
Harford	4,400	226			4,400	226
Kent	16,300	632			16,300	632
Queen Anne	10,200	408			10,200	408
Somerset	11,100	695			11,100	695
Talbot	1,500	75			1,500	75
Worcester	41,330	2,322			41,330	2,322
Total	110,480	5,392	8,500	199	118,980	5,591
Grand total	221,780	9,505	75,900	2,204	297,680	11,709

STATEMENT, BY COUNTIES, OF THE TRAMMEL-NET CATCH IN THE SHORE FISHERIES OF MARYLAND IN 1904.

Species.	Anne Arundel.		Cecil.		Harford.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Carp					6,000	$133	6,000	$133
Catfish	100	$8	3,000	$90	1,500	82	4,600	180
Mullet					200	4	200	4
Perch, white			2,500	125	600	36	3,100	161
Perch, yellow	2,000	200	1,000	30			3,000	230
Pike	2,000	200	1,500	150	500	50	4,000	400
Striped bass			1,000	125	18,900	2,431	19,900	2,556
Sunfish	1,000	80					1,000	80
Total	5,100	488	9,000	520	27,700	2,736	41,800	3,744

STATEMENT, BY COUNTIES, OF THE CATCH BY MINOR APPARATUS IN THE SHORE FISHERIES OF MARYLAND IN 1904.

Species.	Anne Arundel.		Baltimore.		Calvert.		Charles.		Dorchester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Crabs, soft	92,800	$9,280			60,000	$5,250	4,000	$300	148,433	$4,140
Shrimps			2,400	$800						
Total	92,800	9,280	2,400	800	60,000	5,250	4,000	300	148,433	4,140

Species.	St. Mary.		Somerset.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Perch, white					250	$20			250	$20
Crabs, soft	3,400	$180	1,310,857	$39,821					1,619,490	58,971
Shrimps									2,400	800
Terrapin			675	800			230	$162	905	962
Total	3,400	180	1,311,532	40,621	250	20	230	162	1,623,045	60,753

Statement, by Counties, of the Bow-net Catch in the Shore Fisheries of Maryland in 1904.

Species.	Somerset.		Wicomico.		Worcester.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Catfish	100	$5	1,450	$73			1,550	$78
Perch, white	150	10	2,700	172			2,850	182
Shad	9,000	600			31,900	$1,859	40,900	2,459
Striped bass	50	6	1,250	126			1,300	132
Total	9,300	621	5,400	371	31,900	1,859	46,600	2,851

NOTES AND DETAILED STATISTICS OF PRINCIPAL FISHERIES.

Oyster.—In addition to the prolific waters of Chesapeake Bay Maryland has important oyster grounds in Tangier Sound and in the Potomac, Choptank, Nanticoke, and Patuxent rivers. Dredging is the method of oystering followed in the open waters of the bay, but oysters from the rivers are mostly tonged.

Since 1901 the yield of oysters has decreased more than 22 per cent in quantity and 20 per cent in value. The decrease in quantity has been continuous for several years, but 1904 is the first year recording diminished value, a condition attributed by many to the two consecutive cold winters, by which many oysters are said to have been killed. In a few localities the oysters were covered with a growth of mussels, which considerably reduced their market value; and in Wicomico and Dorchester counties oysters on private beds failed to fatten, in many cases remaining unfit for market during the entire season.

The oyster-planting business in Somerset County shows a decided improvement since 1901. In this locality most of the oysters on private beds are raised from spat collected upon oyster shells deposited on the grounds. The same practice is followed in Dorchester and Wicomico counties, but not to the same extent, most of the supply there being raised from seed oysters brought from the Potomac River. Baltimore, Cambridge, and Crisfield continue to support very extensive oyster-shucking establishments. The prosperity of Cambridge especially depends upon this trade. The following table shows the extent of the oyster fishery of Maryland during the season of 1904–5.

THE OYSTER FISHERY OF MARYLAND IN 1904.

Counties.	Market oysters from natural rock.		Market oysters from private beds.		Seed oysters from natural rock.		Total.	
	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.
Anne Arundel	511,750	$257,377					511,750	$257,377
Baltimore	125,850	85,944					125,850	85,944
Calvert	152,150	114,689					152,150	114,689
Charles	48,650	23,257					48,650	23,257
Dorchester	955,660	487,894	58,290	$35,040			1,013,950	522,934
Kent	146,100	72,526					146,100	72,526
Queen Anne	179,950	89,965					179,950	89,965
St. Mary	335,325	178,547					335,325	178,547
Somerset	719,455	439,515	150,615	91,434	91,635	$14,737	961,705	545,686
Talbot	535,245	265,262	6,800	6,272			542,045	271,534
Wicomico	147,615	81,171	114,930	58,440	8,000	1,200	270,545	140,811
Worcester	4,100	2,845	133,930	110,464	3,600	1,095	141,630	114,404
Total	3,861,850	2,098,992	464,565	301,650	103,235	17,032	4,429,650	2,417,674

Crab.—In contrast to the decline of the oyster industry in the past few years is the increasing importance of the Maryland crab fishery. Crabs are in growing demand from all parts of the country owing to the fact that for a number of years the supply in more northern waters has considerably decreased. Crisfield and Deal Island continue to be the principal shipping points for soft crabs, while Oxford, Cambridge, and Mount Vernon furnish most of the hard crabs. From Cambridge and Mount Vernon the crabs are shipped alive, while at Oxford most of them are utilized by extracting the meat and shipping it in tin buckets. This latter feature of the industry has increased in importance since 1901 owing to a more constant supply, brought by local boats from Virginia waters. Hard crabs are caught on trot lines; soft crabs are taken mainly with scrapes and scoop nets, the former being operated entirely from sailboats and the latter from small skiffs and by men wading. The price of soft crabs has advanced somewhat in the last few years, and fishermen now stop catching when the price falls below 1 cent per crab. At Crisfield the oyster industry, which formerly was the town's chief support, has been superseded in importance by the crab trade. As many as 1,000 boxes holding 15 dozen soft crabs each are sometimes shipped from this point by express in one day. With scarcely any outlay aside from his boat and scrapes or scoop nets, an expert crabber, aided by a small boy, can now make more than $100 a month during the season.

Clam.—Clams are taken only in Chincoteague and Sinepuxent bays off Worcester County and in Tangier Sound near Crisfield. Owing to the more profitable crab fishery there has been quite a decrease in the number of clammers from the latter town. Most of them are negroes.

Shad.—Although there has been a conspicuous falling off in the shad catch in the rivers of Maryland since 1901, the increase in Chesa-

peake Bay has almost compensated so far as the total yield is concerned. The product for 1904 showed a 6 per cent decrease in quantity and an increase of 32 per cent in value. The large catch in the open waters, however, contrasting with the scarcity of fish in the streams, emphasizes the precarious condition of the fishery, the decline of which is inevitable when such a large proportion of the fish are captured before reaching the spawning grounds.

NUMBER AND VALUE OF THE SHAD TAKEN IN EACH COUNTY OF MARYLAND IN 1904.

Counties.	No.	Value.	Counties.	No.	Value.
Anne Arundel	10,570	$2,981	Queen Anne	1,405	$366
Calvert	27,627	6,303	St. Mary	8,850	1,445
Caroline	3,750	842	Somerset	13,356	2,403
Cecil	148,635	27,584	Talbot	70,103	14,120
Charles	60,075	11,988	Wicomico	45,358	9,879
Dorchester	74,801	15,267	Worcester	11,505	2,825
Harford	139,353	26,318			
Kent	140,065	33,781	Total	a 772,575	159,772
Prince George	17,122	3,670			

a 2,912,249 pounds.

Below is shown the shad catch of the state by waters. It will be seen that nearly two-thirds of the total was taken from Chesapeake Bay. The Potomac, Susquehanna, Choptank, Nanticoke, Wicomico, and other rivers also furnished large quantities, but while the catch in the bay, compared with 1901, has increased 63 per cent, that in the rivers shows a decrease as follows: Potomac, 43 per cent; Susquehanna, 41 per cent; Choptank, 71 per cent; Nanticoke, 11 per cent; Wicomico, 17 per cent. These figures apply to that portion of these waters within the boundaries of Maryland. In the upper portion of some of these rivers, where extensive shad gill-net fisheries were prosecuted several years ago, there is now practically no fishing.

SHAD CATCH OF MARYLAND IN 1904, SHOWN BY WATERS IN THE ORDER OF THEIR IMPORTANCE, ACCORDING TO NUMBER OF SHAD TAKEN.

Waters.	No.	Value.	Waters.	No.	Value.
Chesapeake Bay	466,163	$96,368	Chester River	4,215	$1,010
Potomac River	83,147	16,343	West River	3,750	962
Susquehanna River	39,275	8,087	Blackwater River	2,088	497
Choptank River	38,862	7,907	Little Choptank River	1,405	330
Nanticoke River	31,028	7,308	Atlantic Ocean	1,240	402
Wicomico River	28,370	5,946	Tangier Sound	1,090	153
Pocomoke River	13,995	3,179	Bush River	866	180
North East River	13,315	2,626	Honga River	718	148
Fishing Bay	10,980	1,801	St. Martins River	115	31
Patuxent River	9,577	2,483	Manokin River	16	5
Elk River	8,850	1,600			
Sassafras River	8,150	1,592	Total	772,575	159,772
Pocomoke Sound	5,360	814			

The following table shows by states the total catch of shad in the interstate rivers. These figures show decreases since 1901 as follows: Potomac River, 53 per cent; Susquehanna, 30 per cent; Nanticoke, 25 per cent; Pocomoke, 77 per cent.

CATCH OF SHAD IN INTERSTATE WATERS.

Waters and States.	No.	Value.	Waters and States.	No.	Value.
Potomac River:			Nanticoke River:		
Maryland	83,147	$16,343	Maryland	31,028	$7,308
Virginia	289,500	51,709	Delaware	22,450	5,321
Total	372,647	68,052	Total	53,478	12,629
Susquehanna River:			Pocomoke River:		
Maryland	39,275	8,087	Maryland	5,360	814
Pennsylvania	76,521	19,867	Virginia	1,550	380
Total	115,796	27,954	Total	6,910	1,194

Alewife.—In the catch of alewives since 1901 there is seen an increase of 5 per cent in quantity and 51 per cent in value, the latter being due largely to the greater quantity salted by the fishermen. In Cecil and Harford counties considerably less than one-half of the catch is sold fresh. The fishing season is so short and the quantities taken are so large that except when salted it is often impossible to dispose of the fish at any price.

Menhaden.—Practically all of the menhaden shown for the state were taken by two steamers owned at Crisfield and were utilized in a factory situated near that town. Some also were taken with seines in the shore fisheries of Worcester County.

Striped bass and white perch.—Compared with 1901 the catch of striped bass in 1904 shows a decrease of 12 per cent in quantity and an increase of 5 per cent in value. The quantity and value of white perch are 20 per cent and 23 per cent respectively, an increase attributed to artificial propagation by the state and, more recently, by the United States.

The increase in the quantity of white perch is especially encouraging when it is remembered that it had fallen off 51 per cent in quantity between 1897 and 1901. The purse seine fishery for these two species in Chesapeake Bay, which is operated mainly by men living at Rock Hall, Kent County, shows a slight decrease in quantity but increase in value. It is claimed by the fishermen, however, that a recent law restricting the area of operations will make this fishery less profitable.

Yellow perch.—There has been a decrease of 9 per cent in quantity and an increase of 11 per cent in value of the yield of this species. An increase is shown for Anne Arundel, Cecil, Dorchester, Talbot, and Harford counties, but a decrease for Baltimore and Kent counties.

Sturgeon and caviar.—Owing to a more vigorous prosecution of gill-net fisheries in the ocean off Worcester County, the catch of sturgeon in this region since 1901 shows a considerable increase with a proportionate increase in the quantity of caviar prepared. The total yield of sturgeon from Maryland waters, however, shows very little change since 1901. Most of these fish were taken incidentally with other species.

Eel.—Eels are taken very generally throughout the state, mostly in eel pots. At Cambridge, Dorchester County, the fishery is vigorously prosecuted for two or three months, beginning the middle of March. Vessels of 5 tons and over which have been used for dredging oysters are fitted out at the close of the oyster season for eel fishing. Most of the catch is made in the Potomac River, the men living aboard the vessel and fishing from rowboats. The eels are either dressed and sold fresh or salted, or sold round. The latter are usually eels too small to be dressed and are disposed of as bait for hard-crab trot lines.

Terrapin.—Aside from Dorchester County, where an increase is shown, the catch of terrapin has varied little since 1901. In only a few localities is the supply sufficient to justify a special effort to capture these animals.

Other species.—Other important species are catfish, butterfish, and squeteague, the catfish being taken in the rivers and the other species mainly along the coast of Worcester County. The catch of catfish shows a slight increase since 1901, but the quantity of butterfish and squeteague has decreased.

WHOLESALE TRADE.

Baltimore City is the center of the wholesale trade of the state. In the quantity of oysters handled it leads all cities in the United States, and several of the largest firms have established branch houses on the Gulf coast within the past few years. Owing to the decline of this fishery, however, the investment and number of persons employed in canning and shucking houses shows a large decrease since 1901. There has also been a falling off in the production of lime from oyster shells, due, it is said, to a smaller demand from the gas companies, who formerly used the largest part of the output.

The following table shows, by localities, the number and value of establishments, the cash capital employed, and the number of persons engaged in the wholesale fishery trade of Maryland in 1904:

WHOLESALE FISHERY TRADE OF MARYLAND IN 1904.

Localities.	Establishments.		Cash capital.	No. of persons engaged.	Wages paid.
	No.	Value.			
Annapolis and Shady Side	4	$14,750	$12,500	189	$32,500
Baltimore	122	1,376,544	1,989,200	5,559	837,925
St. Michaels and Claiborne	6	13,200	9,650	241	11,225
Tilghman Island	5	10,350	13,500	224	21,000
Oxford and Bellevue	10	32,325	29,500	565	55,900
Crisfield, Lawsonia, and Smith Island	49	153,180	137,300	1,147	120,650
Deal Island and Chance	14	8,780	3,850	116	10,575
Fairmount, Kingston, and Oriole	13	19,090	13,250	235	26,650
Marion, Hopewell, and Shelltown	7	17,735	14,800	313	34,100
Cambridge and Secretary	24	60,315	48,000	910	79,100
Fishing Creek and Hoopersville	2	3,000	2,000	180	4,500
Lakesville and Wingate	2	800	1,100	24	700
Havre de Grace, Perryville, and North East	4	6,650	5,000	69	3,100
Bivalve and Tyaskin	2	6,025	10,500	160	4,000
Solomons and Benedict	4	1,100	21,500	17	1,135
Total	268	1,723,844	2,311,650	9,949	1,223,060

FISHERIES OF VIRGINIA.

GENERAL AND COMPARATIVE STATISTICS.

Virginia holds first rank among the Middle Atlantic States for quantity of its fishery products and second for value, being exceeded in the latter respect by New York. The fisheries of Virginia in 1904 yielded 355,315,798 pounds, valued at $5,584,354, which, with the figures of 1901 in comparison, is a decrease of 22,867,560 pounds, but an increase of $970,970 in value. The decrease is largely in the menhaden catch.

The number of persons engaged was 28,868. Of this number 5,510 were on fishing and transporting vessels, 17,693 in the shore or boat fisheries, and 5,665 in the wholesale fish trade, oyster-packing establishments, and fish-fertilizer factories. Compared with the figures for 1901 a decrease of 457 persons is shown.

The total investment in the fisheries, including vessels, boats, apparatus of capture, value of buildings, and cash capital in 1904 was $4,614,934, an increase of $981,830 since the last canvass.

The products of the vessel fisheries of the state amounted to 258,205,295 pounds, valued at $1,400,905, and those of the shore fisheries 97,110,503 pounds, valued at $4,183,449.

Number of Persons Employed in the Fisheries of Virginia in 1904.

How engaged.	No.
In vessel fisheries	4,327
On vessels transporting	1,183
In shore or boat fisheries	17,693
Shoresmen	5,665
Total	28,868

Investment in the Fisheries of Virginia in 1904.

Items.	No.	Value.	Items.	No.	Value.
Vessels fishing	750	$843,988	Apparatus—shore fisheries—Continued.		
Tonnage	9,149		Gill nets	8,144	$32,957
Outfit		278,187	Fyke nets	584	10,172
Vessels transporting	447	326,650	Lines		4,596
Tonnage	7,046		Eel pots	1,255	1,280
Outfit		53,015	Spears	9	6
Boats—row and sail	12,177	569,044	Oyster dredges	482	6,180
Boats—gasoline	38	22,385	Oyster tongs	9,269	38,827
Apparatus—vessel fisheries:			Crab scrapes	1,118	2,566
Lines		15	Clam tongs, rakes, etc	2,344	6,807
Seines	54	39,905	Weirs and slat traps	41	1,295
Oyster dredges	462	8,300	Minor apparatus		284
Oyster tongs	1,912	7,969	Shore and accessory property		1,166,015
Clam tongs, rakes, etc	375	870	Cash capital		804,100
Crab dredges	22	625			
Apparatus—shore fisheries:					
Seines	266	38,171	Total		4,614,934
Pound nets	1,656	350,725			

PRODUCTS OF THE FISHERIES OF VIRGINIA IN 1904.

Species.	Lbs.	Value.	Species.	Lbs.	Value.
Alewives, fresh	14,309,226	$87,083	Shad	7,419,899	$439,625
Alewives, salted	294,640	3,650	Sheepshead	20,745	904
Black bass	153,600	13,192	Spanish mackerel	357,000	39,390
Bluefish	566,765	27,362	Spot	872,800	37,769
Bonito	14,460	505	Squeteagues	6,951,068	164,979
Butterfish	1,335,391	36,616	Striped bass	451,366	41,803
Carp, German	141,625	4,466	Sturgeon	180,675	15,134
Catfish	556,325	21,920	Caviar and sturgeon eggs	23,211	16,848
Crevalle	270,125	7,409	Suckers	52,645	1,060
Croaker	3,842,709	69,324	Sunfish	24,800	514
Drum	192,495	2,519	Crabs, hard	[a] 10,356,052	179,575
Eels	86,350	4,007	Crabs, soft	[b] 1,910,654	92,909
Flounders	248,640	7,587	Terrapin	1,706	320
Gizzard shad	32,675	653	Turtles	72,335	1,144
Hickory shad	355,883	7,296	Frogs	3,220	690
Hogfish	44,895	4,451	Clams, hard	[c] 1,659,572	220,973
Kingfish	118,390	6,243	Market oysters, natural rock	[d] 19,054,336	1,300,549
Menhaden	247,918,766	515,413	Market oysters, private beds	[e] 20,988,954	1,708,456
Mullet	239,000	7,208	Seed oysters, natural rock	[f] 13,242,733	450,671
Perch, white	635,017	29,501			
Perch, yellow	180,550	6,693	Total	355,315,798	5,584,354
Pike	36,400	2,954			
Pompano	47,840	3,400			
Scup	49,200	1,545			
Sea bass	1,000	44			

[a] Number, 31,068,156.
[b] Number, 5,731,962.
[c] Bushels, 207,446.
[d] Bushels, 2,722,048.
[e] Bushels, 2,998,422.
[f] Bushels, 1,891,819.

THE FISHERIES BY COUNTIES.

Thirty-two counties in Virginia were engaged in the commercial fisheries in 1904, but the three of special importance are Accomac, Northumberland, and Elizabeth City.

The products of Accomac County were valued at $1,068,005, of which $702,890 represents the oyster fishery, $142,501 the clam fishery, $72,697 the menhaden fishery, and $72,397 the soft crab fishery.

In Northumberland County the catch amounted to 127,722,641 pounds, valued at $541,259. This was more in quantity than the yield in any other county in the state. The most important species taken were menhaden, 118,868,000 pounds, valued at $260,262; and shad, 1,676,850 pounds, valued at $108,300.

Elizabeth City County ranks third in the importance of its fisheries, the value of the products amounting to $480,738. More than half this was derived from the oyster fisheries.

The following tables show the extent of the fisheries in each county for the year 1904:

STATEMENT, BY COUNTIES, OF THE NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF VIRGINIA IN 1904.

Counties.	In vessel fisheries.	On vessels transporting.	Inshore or boat fisheries.	Shoresmen.	Total.
Accomac	969	163	2,915	554	4,601
Alexandria		24	79	54	157
Caroline			18		18
Charles City			222		222
Chesterfield			82		82
Elizabeth City	122	28	689	917	1,756
Essex	10	11	266	36	323
Fairfax			204	14	218
Gloucester	163	139	1,226		1,528
Henrico			163		163
Isle of Wight	192	22	259		473
James City			100		100
King George	41	4	184	32	261
King and Queen		5	214		219
King William	18	68	193	243	522
Lancaster	310	125	1,743	751	2,929
Mathews		80	1,031		1,111
Middlesex	7	85	1,473	104	1,669
Nansemond	331	39	553	105	1,028
New Kent			198		198
Norfolk	661	108	656	1,743	3,168
Northampton	250	92	774	348	1,464
Northumberland	714	43	1,132	548	2,437
Princess Anne			564	25	589
Prince George			137		137
Prince William		6	109	4	119
Richmond		42	384	97	523
Stafford		4	204	17	225
Surry			39		39
Warwick	116	16	398		530
Westmoreland	193	17	369	73	652
York	230	62	1,115		1,407
Total	4,327	1,183	17,693	5,665	28,868

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND SHORE PROPERTY EMPLOYED IN THE FISHERIES OF VIRGINIA IN 1904.

Items.	Accomac.		Alexandria.		Caroline.		Charles City.		Chesterfield.		Elizabeth City.	
	No.	Value.	No.	Value.	No.	Val.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	170	$130,157									22	$46,325
Tonnage	1,602										240	
Outfit		28,877										12,230
Vessels transporting	69	76,775	8	$4,850							12	8,100
Tonnage	1,286		90								253	
Outfit		5,980		1,200								925
Boats—row and sail	3,134	176,295	48	1,215	9	$180	128	$2,358	41	$925	379	18,230
Boats—gasoline	8	4,610									6	3,125
Apparatus—vessel fisheries:												
Lines												15
Seines	7	5,005										
Oyster dredges	282	4,550									14	550
Oyster tongs	292	1,373									28	112
Clam tongs, rakes, etc	290	786										
Crab dredges											16	530
Apparatus—shore fisheries:												
Seines	32	1,005	4	825			3	1,475			1	200
Pound nets	190	33,260			3	300					131	35,925
Gill nets	60	1,787	28	2,240	6	180	131	2,819	56	1,228		
Fyke nets	7	150	40	600								
Lines		112						20				840
Spears	9	6										
Oyster dredges	304	4,654										
Oyster tongs	1,717	8,605									225	900
Crab scrapes	1,118	2,566										
Clam tongs, rakes, etc	1,475	4,598									15	180
Minor apparatus		29										8
Shore and accessory property		94,675		1,950		50		900		55		120,075
Cash capital		75,900										118,200
Total		661,755		12,880		710		7,572		2,208		366,470

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND SHORE PROPERTY EMPLOYED IN THE FISHERIES OF VIRGINIA IN 1904—Continued.

Items.	Essex.		Fairfax.		Gloucester.		Henrico.		Isle of Wight.		James City.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Val.
Vessels fishing	2	$3,500			51	$17,375			33	$18,200		
Tonnage	20				424				360			
Outfit		800				10,670				10,793		
Vessels transporting	4	1,750			46	27,975			7	4,500		
Tonnage	28				889				98			
Outfit		525				6,125				1,160		
Boats—row and sail	148	8,870	57	$4,573	718	28,775	89	$1,685	147	8,815	57	$1,520
Boats—gasoline	3	900							1	500		
Apparatus—vessel fisheries:												
Oyster dredges	2	50										
Oyster tongs	4	16			108	432			156	653		
Apparatus—shore fisheries:												
Seines			4	11,300	20	600					3	535
Pound nets	14	1,950	28	3,250	167	33,400					2	250
Gill nets	400	522	18	1,010	150	187	115	2,259	2,349	4,604	793	1,016
Fyke nets	8	135	31	620	80	1,000	60	180	34	662	30	900
Lines		15				225				10		55
Eelpots	50	75							50	50	75	75
Oyster tongs	181	724			969	3,876			155	620	50	200
Clam tongs, rakes, etc					170	425						
Weirs and slat traps					1	75	23	460			3	75
Shore and accessory property		2,350		4,945		3,150		160		1,400		575
Cash capital		5,000										
Total		27,182		25,698		134,290		4,744		51,967		5,201

Items.	King and Queen.		King George.		King William.		Lancaster.		Mathews.		Middlesex.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing			6	$4,000	4	$3,400	22	$109,375			2	$500
Tonnage			83		51		808				14	
Outfit				1,850		1,100		30,160				375
Vessels transporting	2	$1,550	1	800	25	14,850	42	27,850	26	$13,375	28	19,600
Tonnage	31		18		242		696		489		520	
Outfit		250		150		2,550		6,275		3,400		4,200
Boats—row and sail	138	4,595	94	4,545	142	1,930	942	56,215	586	31,120	1,024	47,070
Boats—gasoline	1	200					14	9,400				
Apparatus—vessel fisheries:												
Seines							9	7,950				
Oyster dredges			12	260			4	100				
Oyster tongs					14	56	26	104			4	16
Apparatus—shore fisheries:												
Seines			2	500	1	150	3	900	20	200	2	150
Pound nets			111	13,825			176	35,200	242	54,150	42	7,800
Gill nets	70	1,025	13	330	246	1,987						
Fyke nets	9	110	54	1,340	7	140					2	40
Lines						106		441		300		390
Oyster dredges			4	24			2	50				
Oyster tongs	120	480	40	160	4	16	1,076	4,304	505	1,945	1,129	4,516
Clam tongs, rakes, etc									30	75		
Weirs and slat traps	2	100			9	540						
Minor apparatus								35		23		32
Shore and accessory property		950		2,495		17,525		193,800		2,600		14,650
Cash capital				2,000		46,500		123,900				11,500
Total		9,260		32,279		90,850		606,059		107,188		110,839

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND SHORE PROPERTY EMPLOYED IN THE FISHERIES OF VIRGINIA IN 1904—Continued.

Items.	Nansemond.		New Kent.		Norfolk.		Northampton.		Northumberland.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	61	$29,700			134	$55,350	60	$53,506	56	$320,500
Tonnage	604				1,248		630		1,937	
Outfit		18,545				42,752		12,926		77,309
Vessels transporting	17	11,000			43	35,775	47	38,275	14	8,750
Tonnage	196				593		585		269	
Outfit		2,025				6,015		3,235		2,050
Boats—row and sail	253	17,215	121	$1,146	386	13,860	826	28,683	830	34,010
Boats—gasoline					3	2,050				
Apparatus—vessel fisheries:										
Seines							5	4,350	33	22,600
Oyster dredges							8	120	78	1,450
Oyster tongs	330	1,343			579	2,350	139	586		
Clam tongs, rakes, etc							85	84		
Crab dredges					4	30	2	65		
Apparatus—shore fisheries:										
Seines	1	275	6	2,400	6	1,800	8	1,986		
Pound nets	3	900			10	8,300	26	17,170	286	60,475
Gill nets	190	612	166	2,971	387	1,121				
Fyke nets	13	390	5	50			3	45		
Lines		5		30		276		374		491
Eelpots									80	80
Oyster dredges									140	1,316
Oyster tongs	392	1,568			330	1,320	410	1,620	367	1,388
Clam tongs, rakes, etc					10	40	229	214		
Weirs and slat traps	3	45								
Minor apparatus		75				8				58
Shore and accessory property		7,550		350		369,755		104,350		193,700
Cash capital		7,500				219,000		67,600		110,000
Total		98,748		6,947		759,802		335,189		834,177

Items.	Princess Anne.		Prince George.		Prince William.		Richmond.		Stafford.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels transporting					2	$800	14	$7,000	1	$700
Tonnage					13		169		9	
Outfit						275		1,925		100
Boats—row and sail	313	$5,475	66	$1,375	38	1,889	247	5,990	71	3,175
Boats—gasoline	2	1,600								
Apparatus—shore fisheries:										
Seines	127	4,475	4	500	5	3,750			10	4,745
Pound nets	14	19,000			22	2,610	37	5,150	68	4,815
Gill nets			71	1,384	7	380	955	1,282	12	725
Fyke nets	1	150			40	800	6	180	94	1,880
Lines		100		10						49
Eelpots	1,000	1,000								
Oyster tongs	100	400					282	1,128		
Clam tongs, rakes, etc.	30	120								
Shore and accessory property		9,355		225		1,550		4,925		4,800
Cash capital								14,000		
Total		41,675		3,494		12,054		41,580		20,989

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND SHORE PROPERTY EMPLOYED IN THE FISHERIES OF VIRGINIA IN 1904—Continued.

Items.	Surry.		Warwick.		Westmoreland.		York.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing			25	$10,525	31	$18,100	71	$23,475	750	$843,988
Tonnage			239		303		586		9,149	
Outfit				6,450		8,775		14,575		278,187
Vessels transporting			7	3,700	5	5,100	27	13,575	447	326,650
Tonnage			100		109		363		7,046	
Outfit				775		850		3,025		53,015
Boats—row and sail	19	$455	205	13,110	210	7,690	711	36,055	12,177	569,044
Boats—gasoline									38	22,385
Apparatus—vessel fisheries:										
Lines										15
Seines									54	39,905
Oyster dredges					62	1,220			462	8,300
Oyster tongs			88	352			144	576	1,912	7,969
Clam tongs, rakes, etc									375	870
Crab dredges									22	625
Apparatus—shore fisheries:										
Seines					4	400			266	38,171
Pound nets			2	250	57	5,945	25	6,800	1,656	350,725
Gill nets	719	1,728	1,200	1,500	2	60			8,144	32,957
Fyke nets			11	220	35	320	14	260	584	10,172
Lines		5		20		57		665		4,596
Eelpots									1,255	1,280
Spears									9	6
Oyster dredges					32	136			482	6,180
Oyster tongs			303	1,212	124	685	790	3,160	9,269	38,827
Crab scrapes									1,118	2,566
Clam tongs, rakes, etc							385	1,155	2,344	6,807
Weirs and slat traps									41	1,295
Minor apparatus								16		284
Shore and accessory property		50		625		4,975		1,500		1,166,015
Cash capital						3,000				804,100
Total		2,238		38,739		57,313		104,837		4,614,934

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF VIRGINIA IN 1904.

Species.	Accomac.		Alexandria.		Caroline.		Charles City.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	506,840	$5,599			4,800	$48	42,400	$418
Black bass	300	33	9,600	$960			1,650	132
Bluefish	45,250	2,442						
Bonito	1,600	128						
Butterfish	106,700	2,537						
Carp			825	16	300	6	5,690	171
Catfish	1,700	59	34,400	1,720	1,500	45	4,825	195
Croaker	172,550	3,391						
Drum	35,100	495						
Eels	3,100	181	800	34				
Flounders	24,830	923						
Gizzard shad							13,400	268
Hickory shad							1,618	40
Kingfish	17,950	934						
Menhaden	36,544,360	72,697						
Mullet	73,400	2,240						
Perch, white	7,400	367	13,300	665	600	30	7,350	402
Perch, yellow			22,000	755			2,500	90
Pike			1,350	135			300	24
Pompano	11,930	1,114						
Scup	7,000	360						
Sea bass	1,000	44						
Shad	497,084	24,005	99,350	5,320	9,450	540	200,894	10,889
Spanish mackerel	30,550	2,967						
Spot	55,130	2,197						
Squeteague	601,100	17,025						
Striped bass	8,100	911	2,000	160	800	64	4,850	485
Sturgeon	42,500	2,625					3,800	380
Caviar and sturgeon eggs	5,684	4,915					480	408
Suckers			1,350	27			2,475	63
Crabs, hard	193,600	1,783						
Crabs, soft	1,649,354	72,397						
Terrapin	206	245						
Turtles							1,400	70
Frogs							840	180
Clams, hard	1,111,100	142,501						
Market oysters, natural rock	3,216,045	234,935						
Market oysters, private beds	3,939,719	384,049						
Seed oysters, natural rock	2,455,670	83,906						
Total	51,366,852	1,068,005	184,975	9,792	17,450	733	294,472	14,215

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Chesterfield.		Elizabeth City.		Essex.		Fairfax.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	44,000	$880	252,936	$2,504	26,800	$268	1,585,360	$5,663
Alewives, salted							214,640	2,400
Black bass							15,[illegible]	1,[illegible]
Bluefish			158,675	8,805				
Butterfish			213,511	5,677	25,100	876		
Carp					2,[illegible]	52	7,[illegible]	213
Catfish					22,[illegible]	[illegible]	45,[illegible]	1,[illegible]
Crevalle			61,[illegible]	1,737				
Croaker			862,[illegible]	14,127				
Drum			7,845	[illegible]				
Eels					1,[illegible]	135	3,800	152
Flounders			41,7[illegible]	[illegible]	700	25		
Hickory shad			28,[illegible]	[illegible]				
Hogfish			15,8[illegible]	1,2[illegible]				
Kingfish			4,000	244				
Menhaden			2,175,740	8,[illegible]				
Mullet			3,000	[illegible]				
Perch, white			19,5[illegible]	778	4,100	171	31,821	1,765
Perch, yellow							14,[illegible]	546
Pike							2,500	250
Pompano			12,077	700				
Scup			54,[illegible]	1,[illegible]				
Shad	66,000	3,300	405,2[illegible]	23,[illegible]	61,[illegible]	[illegible]	85,[illegible]	4,[illegible]
Spanish mackerel			42,675	6,[illegible]				
Spot			105,8[illegible]	5,[illegible]				
Squeteague			1,832,321	37,707	14,900	596		
Striped bass			1,[illegible]	14[illegible]	9,450	770	10,000	1,[illegible]
Sturgeon			21,435	2,119				
Caviar and sturgeon eggs			2,266	1,925				
Suckers					300	6	10,150	203
Sunfish							300	9
Crabs, hard			2,7[illegible]	57,[illegible]				
Crabs, soft			4,000	[illegible]				
Turtles			3,700	36				
Clams, hard			112,000	16,800				
Market oysters, natural rock			477,358	31,831	160,300	13,700		
Market oysters, private beds			3,049,907	217,850	668,003	56,757		
Seed oysters, natural rock			917,700	31,580	3,500	150		
Total	110,000	4,180	13,590,076	480,738	993,103	76,875	2,036,650	20,947

Species.	Gloucester.		Henrico.		Isle of Wight.		James City.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	360,000	$3,600	115,600	$2,312			39,690	$392
Black bass			150	15				
Butterfish	225,750	6,772						
Carp	5,600	56	6,900	197	7,500	$225	7,700	261
Catfish	28,200	846	26,200	1,310	35,500	1,085	17,100	684
Crevalle	93,400	2,802						
Croaker	412,700	6,493			47,520	1,395		
Drum	35,000	350						
Eels	3,800	114			2,000	100	5,500	440
Flounders	57,000	2,280			18,775	413		
Gizzard shad							3,500	7[illegible]
Hickory shad	75,000	1,500						
Menhaden	300,000	500						
Mullet	30,000	1,200						
Perch, white	9,700	485	8,300	445	12,487	[illegible]	1[illegible],7[illegible]	872
Pompano	5,600	280						
Shad	721,262	51,444	102,700	5,325	127,650	8,045	107,200	7,[illegible]
Spanish mackerel	75,150	7,515						
Spot	15,000	600						
Squeteague	246,625	5,237			27,832	836	8,000	24[illegible]
Striped bass	18,700	1,820			6,850	82[illegible]	[illegible],270	[illegible]
Sturgeon	15,000	1,500			7,110	[illegible]		
Caviar and sturgeon eggs	1,500	750			390	[illegible]		
Suckers			2,500	37			3,500	7[illegible]
Crabs, hard	181,800	2,727						
Turtles	25,000	250					2,000	100
Frogs							1,4[illegible]	[illegible]
Clams, hard	110,880	16,632						
Market oysters, natural rock	1,120,700	69,705			485,800	28,915		
Market oysters, private beds	645,190	48,185			455,000	[illegible]	248,[illegible]	21,[illegible]
Seed oysters, natural rock	955,150	35,340			1,618,750	[illegible]		
Total	5,773,707	268,983	262,350	9,641	2,853,164	128,766	487,000	35,919

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	King George.		King and Queen.		King William.		Lancaster.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	1,538,400	$6,325	25,000	$250	36,400	$558	425,600	$1,721
Black bass	250	25						
Bluefish	4,000	200	75	5	275	14	7,800	312
Butterfish							67,450	2,023
Carp	3,100	64	200	6	3,060	56		
Catfish	109,950	4,271	10,000	325	26,700	985	4,200	126
Croaker			2,500	75	3,000	60	51,700	1,041
Drum							3,500	35
Eels	200	6	2,900	87	2,300	69	500	15
Flounders	12,300	347	400	16	1,600	64	5,350	214
Gizzard shad	1,200	24	2,000	20	1,075	21		
Hickory shad							25,350	507
Menhaden							64,966,666	121,749
Perch, white	80,350	4,751	1,500	78	5,500	275		
Perch, yellow	42,200	1,693						
Pike	200	15						
Shad	90,149	4,786	75,337	3,228	161,025	7,397	697,725	39,870
Spanish mackerel							25,400	3,048
Spot			100	5	350	15	15,300	459
Squeteague	10,200	376	5,500	110	9,700	279	179,500	4,510
Striped bass	110,275	9,287	6,700	654	9,800	950	6,500	520
Sturgeon							12,500	1,000
Caviar and sturgeon eggs							1,900	1,445
Suckers			400	8	6,820	98		
Crabs, hard					120,000	1,800	285,826	4,937
Crabs, soft							74,200	5,565
Market oysters, natural rock	168,875	10,855	252,000	21,600	10,500	1,200	1,379,000	98,500
Market oysters, private beds			492,100	42,180			1,377,600	112,930
Seed oysters, natural rock					112,000	4,800		
Total	2,171,649	43,025	876,712	68,647	510,105	18,641	69,613,567	400,527

Species.	Mathews.		Middlesex.		Nansemond.		New Kent.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	1,392,800	$13,928	140,400	$1,404	2,250	$58	155,900	$1,189
Black bass							1,100	102
Bluefish	21,850	805	1,600	48				
Butterfish	200,900	4,100	68,500	1,960	20,000	600		
Carp					700	28		
Catfish			1,500	45	5,150	184	9,100	425
Crevalle	25,200	756						
Croaker	172,600	2,589	21,300	548	37,950	759		
Drum	15,000	150						
Eels							200	8
Flounders	11,500	345	2,400	72	4,000	80	100	3
Hickory shad	98,550	1,971	6,250	150				
Menhaden	310,000	490	44,000	440				
Mullet	25,000	650			16,500	495		
Perch, white			3,000	150	4,950	197	8,350	662
Perch, yellow							3,800	120
Pike							2,000	160
Pompano	5,000	250						
Shad	1,260,000	72,000	157,100	8,070	67,046	5,677	165,335	7,321
Sheepshead	3,500	70						
Spanish mackerel	61,000	6,100	5,200	624	800	80		
Spot	16,450	493	2,000	60	20,000	700		
Squeteague	234,500	4,690	96,200	3,720	69,300	1,769		
Striped bass	3,000	300	18,500	1,850			1,700	160
Sturgeon	23,300	2,330	1,500	150				
Caviar and sturgeon eggs	4,155	2,077	135	67				
Suckers							7,300	191
Crabs, hard	840,000	10,499	466,666	6,250				
Crabs, soft	25,000	1,825	19,300	1,610				
Turtles	25,000	250					1,500	75
Frogs							980	210
Clams, hard	12,000	1,800						
Market oysters, natural rock	847,000	63,800	1,643,250	117,375	1,558,396	102,002		
Market oysters, private beds	383,600	41,850	1,089,900	92,650	934,500	66,750	70,000	6,000
Seed oysters, natural rock	70,000	2,500			1,461,950	49,225		
Total	6,086,905	236,618	3,788,701	237,243	4,203,492	228,604	427,365	16,626

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Norfolk.		Northampton.		Northumberland.		Princess Anne.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	135,800	$2,058	49,200	$628	4,291,000	$20,440	147,200	$2,053
Black bass							50,000	3,000
Bluefish	53,500	2,115	26,250	1,331	23,400	1,354	202,490	8,448
Bonito			1,810	54			11,050	323
Butterfish	73,000	2,480	22,750	538	58,700	1,227	210,130	6,674
Carp	350	10					25,000	625
Catfish							15,000	375
Crevalle	30,500	665	15,325	380			27,750	569
Croaker	303,050	6,131	39,360	818	42,950	804	1,315,650	25,419
Drum	23,000	300	27,950	627			42,100	421
Eels			600	36	3,500	105	45,000	2,250
Flounders	14,400	340	7,295	228	18,600	668	18,150	438
Hickory shad					120,125	2,662		
Hogfish	6,300	640	920	44			19,875	2,327
Kingfish	29,500	1,915	11,530	525			54,510	2,625
Menhaden	300,000	795	24,160,000	49,006	118,868,000	260,262		
Mullet	23,500	675					64,100	1,788
Perch, white	10,350	393					228,530	6,780
Perch, yellow							33,500	1,005
Pike							13,350	801
Pompano			1,850	223			11,385	824
Scup			8,260	165				
Shad	50,250	4,880	19,640	982	1,676,850	108,300	22,700	1,783
Sheepshead	2,500	125	120	6			14,625	701
Spanish mackerel	4,000	480	38,125	4,570	14,200	2,130	59,900	4,923
Spot	173,250	9,365	38,120	1,310	34,700	1,270	384,550	15,722
Squeteague	623,150	17,602	1,239,035	20,326	252,400	7,114	1,291,980	38,013
Striped bass			11,850	1,237	28,950	2,746	15,275	1,169
Sturgeon	4,825	386	840	36	19,250	1,540	10,280	748
Caviar and sturgeon eggs	855	618	16	12	3,025	1,917	915	816
Sunfish							23,000	460
Crabs, hard	1,816,250	40,750	1,515,000	13,798	643,716	9,381	690,625	14,162
Crabs, soft	14,400	1,080			117,200	9,592		
Turtles	4,200	70			3,000	60	835	9
Clams, hard	12,800	2,400	99,352	10,384			6,400	1,200
Market oysters, natural rock	3,005,730	196,944	437,325	29,193	1,237,075	86,887		
Market oysters, private beds	2,103,500	149,350	2,426,935	163,715	266,000	22,800	126,000	40,000
Seed oysters, natural rock	740,803	24,779	1,077,370	33,116			80,640	5,760
Total	9,559,763	467,346	31,276,828	333,288	127,722,641	541,259	5,262,495	192,211

Species.	Prince George.		Prince William.		Richmond.		Stafford.		Surry.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value
Alewives, fresh	30,000	$450	460,000	$2,225	105,520	$1,055	1,360,000	$6,780		
Alewives, salted							80,000	1,250		
Black bass	5,500	440	10,200	1,020			59,850	5,965		
Bluefish							800	40		
Carp	22,500	675	8,300	309	3,550	70	25,450	1,261		
Catfish	12,300	515	35,450	1,655	10,500	327	77,300	3,360		
Croaker					5,900	177				
Eels			2,300	85	1,800	54	2,500	100		
Flounders							800	24		
Gizzard shad	5,000	100			6,500	150				
Mullet	3,500	70								
Perch, white	5,500	300	19,200	1,103	12,050	602	52,400	3,019		
Perch, yellow			16,600	652			39,550	1,572		
Pike			2,700	270			11,600	1,160		
Shad	141,800	7,400	9,675	432	120,137	6,865	19,125	1,006	66,406	$3,552
Squeteague					17,800	534	1,000	40		
Striped bass	800	64	6,500	583	18,125	1,460	24,600	2,410	550	44
Sturgeon	5,125	512							7,560	756
Caviar and sturgeon eggs	405	344							1,215	1,033
Suckers			8,850	177			9,000	180		
Terrapin	1,500	75								
Turtles	1,000	50					2,000	85		
Market oysters, natural rock					294,000	25,200				
Market oysters, private beds					674,800	57,840				
Total	234,930	10,995	579,775	8,511	1,270,682	94,334	1,765,975	28,252	75,731	5,385

STATEMENT, BY COUNTIES, OF THE PRODUCTS OF THE FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Warwick.		Westmoreland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives, fresh	2,400	$24	960,000	$3,677	73,020	$576	14,309,226	$87,083
Alewives, salted							294,640	3,650
Black bass							153,600	13,192
Bluefish			5,900	281	14,900	1,162	566,765	27,362
Bonito							14,460	505
Butterfish					42,900	1,252	1,335,391	36,616
Carp			4,700	165			141,625	4,466
Catfish	4,250	149	27,600	1,073			556,325	21,920
Crevalle					16,000	480	270,125	7,409
Croaker	49,000	775			302,350	4,722	3,842,709	69,324
Drum					3,000	42	192,495	2,519
Eels			1,050	36			86,350	4,007
Flounders	1,000	20	2,250	72	5,400	159	248,640	7,587
Gizzard shad							32,675	653
Hickory shad							355,883	7,296
Hogfish	2,000	160					44,895	4,451
Kingfish							118,390	6,243
Menhaden					270,000	540	247,918,766	515,413
Mullet							239,000	7,208
Perch, white	550	30	75,550	4,182			635,017	29,501
Perch, yellow			6,300	260			180,550	6,693
Pike			2,400	139			36,400	2,954
Pompano							47,840	3,400
Scup							49,260	1,545
Sea bass							1,000	44
Shad	54,250	3,140	35,850	2,040	45,150	2,580	7,419,899	439,625
Sheepshead							20,745	904
Spanish mackerel							357,000	39,390
Spot	3,500	280			8,500	265	872,800	37,769
Squeteague	41,225	829	15,700	712	133,100	2,714	6,951,068	164,979
Striped bass	475	47	82,300	7,688	3,875	360	451,366	41,803
Sturgeon					5,650	452	180,675	15,134
Caviar and sturgeon eggs					270	229	23,211	16,848
Suckers							52,645	1,060
Sunfish			1,500	45			24,800	514
Crabs, hard			120,496	1,812	741,500	14,372	10,356,052	179,575
Crabs, soft					7,200	540	1,910,654	92,909
Terrapin							1,706	320
Turtles			900	62	1,800	27	72,335	1,144
Frogs							3,220	690
Clams, hard					195,040	29,256	1,659,572	220,973
Market oysters, natural rock	501,312	28,663	814,345	55,654	1,445,325	83,590	19,054,336	1,300,549
Market oysters, private beds	532,700	37,050			1,505,000	114,700	20,988,954	1,708,456
Seed oysters, natural rock	1,465,800	50,574			2,283,400	76,391	13,242,733	450,671
Total	2,658,462	121,741	2,156,841	77,898	7,103,380	334,409	355,315,798	5,584,354

THE PRODUCTS BY APPARATUS.

The pound nets operated in Virginia yielded a catch greater than that of all other apparatus in the state combined. The number of nets was 1,656, valued at $350,725, and the catch amounted to 37,476,338 pounds, valued at $850,710. The nets were fished in 22 of the 32 counties engaged in commercial fisheries.

In Princess Anne County pound nets are set in the Atlantic Ocean off Virginia Beach, and in Lynnhaven Bay, off the mouth of Lynnhaven Inlet, there being, in 1904, 10 nets in the ocean and 4 in the bay.

The pound-net fishery of Norfolk County is prosecuted at Ocean View, where 6 nets were operated, and also at Hampton Roads, where 4 nets were set off Sewells Point and Willoughby Spit. The number of nets fished in Norfolk County has decreased more than

50 per cent since 1901, to some extent on account of changes in the location of nets which placed them in other counties.

The eastern counties of Virginia, Accomac and Northampton, also have valuable pound-net fisheries. Accomac County shows an increase of 62 nets and Northampton 10. These, with the exception of a few nets fished in the ocean off Accomac County, are all located on the eastern, or Chesapeake Bay, side of these counties. Squeteague, shad, and Spanish mackerel were the most valuable species taken.

The pound-net fisheries of Elizabeth City County are of great importance, and yield nearly one-half of the entire catch of the county. They aggregated, in 1904, 6,052,338 pounds, valued at $113,823, an output exceeded by only one county. The number of nets in use was 131, an increase of 28 over the year 1901. One hundred and four of these nets were set between Back River light and Fortress Monroe, and 27 between Hampton and Newport News.

In York County, from the mouth of the Poquosin River to Toos Point light, 23 pound nets were fished, and in addition two were set in York River, near Yorktown, a total of 25 nets for the county.

Most of the pound nets of Gloucester County are located in Mobjack Bay and vicinity. With the exception of the oyster fishery, the pound-net fishery is the most valuable branch in this county.

The value of the pound-net catch in Mathews County is greater than that of any other form of apparatus used in the county. The number of nets fished in 1904 was 242, an increase of 53 since 1901. The greater portion were fished in the spring, only 35 being operated in the fall. Fifty-four were set in Chesapeake Bay, 4 in East River, and 184 in Mobjack Bay and vicinity.

In Middlesex County the pound-net fisheries are located principally in the Rappahannock River, though a few are fished in the mouth of the Plankatank River. They are not so extensively used in this county as on the western side of the bay, and are fished only in the spring. The catch is mostly shipped by steamer to Baltimore. The number of nets operated in 1904 was 42.

In the upper part of the Rappahannock River, in Richmond, Essex, Caroline, and King George counties, a number of pound-nets were operated by farmers and others living near the river. These are much smaller than the nets fished near the mouth of the river. The catch consists of catfish, carp, perch, striped bass, shad, and some other species.

Pound nets are the most productive apparatus used in the shore fisheries of Lancaster County. The fishing grounds are located in Chesapeake Bay and the Rappahannock River. The total number of nets fished was 176, most of which were set in the spring. The

catch amounted to 1,830,275 pounds, valued at $57,346. Of this quantity 697,725 pounds, valued at $39,870, consisted of shad.

Northumberland County has the most important pound-net fisheries in Virginia, leading all other counties in the number of nets operated and in the quantity and value of the catch. The nets are set in both the Potomac River and Chesapeake Bay, 113 being credited to the former and 173 to the latter body of water. Those in the bay extend from the mouth of Wicomico River to Smiths Point, and those in the Potomac from Smiths Point to Hog Island. The Potomac River nets are fished in the spring only, the season extending from March 1 to May 30. The catch consists principally of shad and herring.

The pound nets of Westmoreland County are set in the Potomac River off Colonial Beach and vicinity, those of King George County in the Potomac River from the mouth of Upper Machodoc Creek to Maryland Point. They are fished principally in the spring, though a few are operated in the summer and fall, about half of the summer catch being disposed of to hotels and boarding houses at Colonial Beach.

Above Maryland Point, in the counties of Stafford, Prince William, and Fairfax, the pound-net fisheries are of much less importance than in the lower Potomac. The nets are smaller, and many of them are set in the creeks emptying into the river. The catch consists of perch, catfish, striped bass, black bass, and other species.

James City, Nansemond, and Warwick are the only counties on the James River having pound-net fisheries. The total number of nets was 7, and the aggregate catch 156,350 pounds, valued at $5,784.

Seines.—Considering the quantity of products taken, seines lead all other forms of apparatus used in the fisheries of this state. The total catch was 246,628,251 pounds, valued at $602,835, of which 241,292,666 pounds, valued at $498,730, was menhaden caught by purse seines in the vessel fishery. The haul seines used in the shore fisheries caught 5,335,585 pounds of fish, valued at $104,105. Twenty-one counties in the state engaged in the haul-seine fishery. The seines vary in length from a few yards to 1,600 fathoms, one of the latter length being used on the Potomac River.

Princess Anne County has the most valuable haul-seine fishery in the state. In 1904, 127 haul seines were operated in this county, securing a catch which had a value of $25,164. Back Bay, located in the southeastern part of the county, near the North Carolina line, furnishes more than half of the catch, 125 seines being operated in this small body of water, and giving employment to 250 fishermen. The seines averaged 150 yards in length. Large quantities of white perch, black bass, yellow perch, mullet, pike, and other species were taken, the catch amounting to 406,780 pounds, valued at $13,539.

Lines.—Two kinds of lines are used, the trot or set line, and the hand line. The former is used principally for catfish and crabs, and the latter for bluefish, croakers, spots, squeteague, and other varieties of fish. The total catch by lines was 9,072,174 pounds, valued at $176,638. This amount includes 10,000 pounds of bluefish taken in the vessel fisheries. Of the total catch 8,145,912 pounds, valued at $140,651, represents hard crabs, leaving a remainder of 926,262 pounds of food fish. The catch in the hand-line fishery shows a large decrease, but the set-line fishery for crabs shows an increase of over 2,000,000 pounds.

Gill nets.—Gill-net fishing is generally confined to the river courses of the state, and very few gill nets are used elsewhere. More than 8,000 were operated in 1904, the catch amounting to 2,162,089 pounds, valued at $100,506, of which shad constitute more than two-thirds in both quantity and value. The catch of sturgeon, including the caviar, was 63,315 pounds, valued at $10,615. More than half of this amount was taken on the ocean side of Accomac County by men fishing near Matomkin Inlet.

Fyke nets.—The fyke-net fishery shows a small increase in the quantity and value of the products, but a decrease in the number of nets fished. The total catch was 687,714 pounds, valued at $31,549. The most important species taken were striped bass, catfish, perch, and squeteague, the catch of these four species constituting nearly two-thirds of the total.

Eel pots and spears.—Eel pots and spears were used in six counties, the yield in all amounting to 62,600 pounds of eels, valued at $3,131. The largest catch was made in Princess Anne County, in the waters of Back Bay, where 1,000 pots caught 45,000 pounds, valued at $2,250.

Minor apparatus.—Under this head are included dip nets, bow nets, and other forms of apparatus not shown elsewhere. The most important is the dip net for soft crabs, the catch amounting to 325,566 pounds of crabs, valued at $23,496. The bow nets were used in taking alewives and shad.

Weirs and slat traps.—Weirs are used principally in the York River, the catch consisting of alewives, catfish, squeteague, and striped bass. The slat traps are set in the falls and rapids of the James River and are fished by persons living in Richmond. In 1904, 23 of these traps were in operation, the catch amounting to 43,600 pounds. The combined catch of weirs and traps aggregated 149,005 pounds, valued at $4,965.

Clam tongs, hoes, and rakes.—The vessel fishery for clams is of small importance compared with that of the shore fishery. Accomac and Northampton are the only counties in which vessels are used. The catch by vessels was 20,440 bushels, valued at $20,293. The shore

catch amounted to 187,006 bushels, valued at $200,680. A few soft clams were taken in Accomac County.

Crab scrapes and dredges.—Scrapes are used in the shore fisheries for catching soft crabs, chiefly in Accomac County. The catch amounted to 1,585,088 pounds, valued at $69,413. In three counties dredges were used in the vessel fisheries for taking hard crabs, securing a catch of 2,210,140 pounds, valued at $38,924.

The catch with dredges and tongs, which are used in both the shore and vessel oyster fisheries, is the most important product of the fisheries of Virginia. The catch by vessels was 2,075,567 bushels, valued at $842,158; the shore catch was 5,536,722 bushels, valued at $2,617,518.

The following tables give the quantity and value of products taken with each form of apparatus in the vessel and shore fisheries of Virginia in 1904:

STATEMENT, BY COUNTIES, OF THE YIELD OF THE POUND-NET FISHERIES OF VIRGINIA IN 1904.

Species.	Accomac.		Caroline.		Elizabeth City.		Essex.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	506,090	$5,587	4,800	$48	252,936	$2,504	26,800	$268
Black bass	300	33						
Bluefish	44,750	2,417			52,975	2,945		
Bonito	1,600	128						
Butterfish	106,700	2,537			213,511	5,577	25,100	876
Carp			300	6			1,500	30
Catfish	1,700	59	1,500	45			3,850	115
Crevalle					61,950	1,757		
Croaker	128,800	2,351			827,629	13,427		
Drum	26,100	339			7,845	99		
Flounders	18,150	685			41,790	856	700	25
Hickory shad					28,990	466		
Hogfish					800	80		
Kingfish	700	86			4,900	244		
Menhaden	1,426,360	1,847			2,155,740	8,934		
Perch, white	2,850	142	600	30	9,000	358	500	25
Pompano	11,930	1,114			12,075	709		
Scup	7,000	360			34,000	1,020		
Shad	497,084	24,005	5,250	300	405,259	23,910	30,450	1,584
Spanish mackerel	30,550	2,967			42,675	6,953		
Spot	35,080	1,529			80,850	3,328		
Squeteague	380,340	10,447			1,790,321	36,427	14,900	596
Striped bass	6,150	671	800	64	1,691	149	6,700	550
Sturgeon	10,240	725			21,435	2,119		
Caviar and sturgeon eggs	714	525			2,266	1,925		
Suckers							300	6
Turtles					3,700	36		
Total	3,243,188	58,554	13,250	493	6,052,338	113,823	110,800	4,075

STATEMENT, BY COUNTIES, OF THE YIELD OF THE POUND-NET FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Fairfax.		Gloucester.		James City.		King George.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	360,000	$1,800	340,000	$3,400	12,000	$120	1,490,400	$6,065
Black bass	2,500	250						
Bluefish							4,000	200
Butterfish			225,750	6,772				
Carp	1,200	48					1,100	22
Catfish	14,400	626			2,400	96	74,650	2,928
Crevalle			93,400	2,802				
Croaker			398,600	5,979				
Drum			35,000	350				
Flounders			50,000	2,000			11,500	315
Gizzard shad							1,200	24
Hickory shad			75,000	1,500				
Menhaden			300,000	500				
Perch, white	18,350	1,077					65,800	3,940
Perch, yellow	2,800	109					39,900	1,596
Pike	500	50						
Pompano			5,600	280				
Shad	8,550	410	716,012	51,144	2,000	150	78,837	4,221
Spanish mackerel			75,150	7,515				
Squeteague			226,875	4,537	8,000	240	10,200	376
Striped bass	7,600	635	2,500	200	10,250	1,230	88,250	7,315
Sturgeon			15,000	1,500				
Caviar and sturgeon eggs			1,500	750				
Suckers	2,000	40						
Turtles			25,000	250				
Total	417,900	5,045	2,585,387	89,479	34,650	1,836	1,865,837	27,002

Species.	Lancaster.		Mathews.		Middlesex.		Nansemond.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	425,600	$1,721	1,392,800	$13,928	140,400	$1,404		
Bluefish	7,800	312	21,850	805	1,600	48		
Butterfish	67,450	2,023	200,900	4,100	68,500	1,960	20,000	$600
Catfish	4,200	126						
Crevalle			25,200	756				
Croaker	51,700	1,041	172,600	2,589	21,300	548	15,000	300
Drum	3,500	35	15,000	150				
Eels	500	15						
Flounders	5,350	214	11,500	345	2,400	72	1,500	30
Hickory shad	25,350	507	98,550	1,971	6,250	150		
Menhaden	300,000	500	310,000	490				
Mullet			10,000	200				
Pompano			5,000	250				
Shad	697,725	39,870	1,260,000	72,000	157,100	8,070	10,000	1,000
Sheepshead			3,500	70				
Spanish mackerel	25,400	3,048	61,000	6,100	5,200	624	800	80
Spot	15,300	459	16,450	493	2,000	60	5,000	250
Squeteague	179,500	4,510	234,500	4,690	96,200	3,720	30,000	750
Striped bass	6,500	520	3,000	300	15,300	1,530		
Sturgeon	12,500	1,000	23,300	2,330	1,500	150		
Caviar and sturgeon eggs	1,900	1,445	4,155	2,077	135	67		
Turtles			25,000	250				
Total	1,830,275	57,346	3,894,305	113,894	517,885	18,403	82,300	3,010

STATEMENT, BY COUNTIES, OF THE YIELD OF THE POUND-NET FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Norfolk.		Northampton.		Northumberland.		Princess Anne.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	135,000	$2,050	49,200	$628	4,291,000	$20,440	147,200	$2,053
Bluefish	45,000	1,690	23,150	1,157	23,400	1,354	157,490	7,298
Bonito			1,810	54			11,050	323
Butterfish	73,000	2,480	22,750	538	58,700	1,227	210,130	6,674
Carp	350	10						
Crevalle	30,500	665	15,325	380			27,750	569
Croaker	143,250	2,927	12,860	138	42,950	804	1,246,000	24,159
Drum	23,000	300	9,450	82			42,100	421
Flounders	8,000	208	4,875	126	18,600	668	18,150	438
Hickory shad					120,125	2,662		
Hogfish	200	30	920	44			2,875	287
Kingfish	15,700	1,165	7,680	365			43,360	1,887
Menhaden	300,000	795			1,020,000	1,700		
Mullet							37,100	1,113
Perch, white	1,300	39					7,600	162
Pompano			1,850	223			11,385	824
Scup			8,260	165				
Shad	27,900	3,050	19,640	982	1,676,850	108,300	22,700	1,781
Sheepshead			120	6			14,625	703
Spanish mackerel	4,000	480	38,125	4,570	14,200	2,130	59,900	4,923
Spot	21,000	1,030	20,320	521	34,700	1,270	173,800	5,705
Squeteague	500,150	13,632	1,068,150	14,265	252,400	7,114	1,164,680	32,268
Striped bass					28,950	2,746	4,475	421
Sturgeon	4,825	386	840	36	19,250	1,540	10,280	748
Caviar and sturgeon eggs	855	618	16	12	3,025	1,917	915	816
Turtles	4,200	70			3,000	60	835	9
Total	1,338,230	31,625	1,305,341	24,292	7,607,150	153,932	3,414,400	93,582

Species.	Prince William.		Richmond.		Stafford.		Warwick.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	332,000	$1,660	104,400	$1,044	356,000	$1,760	2,400	$24
Black bass					32,700	3,250		
Carp	2,300	69	2,400	48	14,700	722		
Catfish	13,100	580	4,800	144	38,550	1,755		
Croaker			5,900	177			8,000	160
Eels			1,800	54				
Flounders					800	24	700	14
Gizzard shad			6,500	150				
Perch, white	9,700	582	9,700	485	22,500	1,350		
Perch, yellow	5,000	200			23,550	932		
Pike	700	70			8,000	800		
Shad	1,050	55	71,137	4,065	1,225	56	2,800	200
Spot							500	40
Squeteague			17,800	534			25,000	500
Striped bass	3,150	315	15,000	1,210	6,500	600		
Total	367,000	3,531	239,437	7,911	504,525	11,249	39,400	938

Statement, by Counties, of the Yield of the Pound-Net Fisheries of Virginia in 1904—Continued.

Species.	Westmoreland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:						
Alewives	960,000	$3,677	69,520	$541	11,398,546	$70,722
Black bass					35,500	3,533
Bluefish	2,500	115	13,900	1,112	398,415	19,453
Bonito					14,460	505
Butterfish			42,900	1,252	1,335,391	36,616
Carp	2,800	92			26,650	1,047
Catfish	21,800	841			180,950	7,315
Crevalle			16,000	480	270,125	7,409
Croaker			273,800	4,151	3,348,389	58,751
Drum			3,000	42	164,995	1,818
Eels					2,300	69
Flounders	2,250	72	4,100	120	200,365	6,212
Gizzard shad					7,700	174
Hickory shad					354,265	7,256
Hogfish					4,795	441
Kingfish					72,340	3,747
Menhaden			270,000	540	6,082,100	15,306
Mullet					47,100	1,313
Perch, white	55,450	3,142			203,350	11,332
Perch, yellow	3,800	160			75,050	2,997
Pike	900	57			10,100	977
Pompano					47,840	3,400
Scup					49,260	1,545
Shad	34,250	1,960	45,150	2,580	5,770,969	349,693
Sheepshead					18,245	779
Spanish mackerel					357,000	39,390
Spot					405,000	14,685
Squeteague	9,700	472	105,400	2,153	6,114,116	137,231
Striped bass	66,300	6,378			273,116	24,834
Sturgeon			5,650	452	124,820	10,986
Caviar and sturgeon eggs			270	229	15,751	10,381
Suckers					2,300	46
Sun fish	1,500	45			1,500	45
Turtles			1,800	27	63,535	702
Total	1,161,250	17,011	851,490	13,679	37,476,338	850,710

Statement, by Counties, of the Yield of the Seine Fisheries of Virginia in 1904.

Species.	Accomac.		Alexandria.		Charles City.		Elizabeth City.		Fairfax.	
	Lbs.	Value.	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value
Vessel fisheries:										
Menhaden	35,118,000	$70,850								
Shore fisheries:										
Alewives, fresh	750	12			40,000	$400			1,225,360	$3,863
Alewives, salted									214,640	2,400
Black bass			9,100	$910	1,500	120			8,000	800
Carp			225	4	5,690	171			4,700	116
Catfish			26,200	1,310	4,300	169			20,900	751
Croaker	7,850	213								
Drum	500	10								
Eels			200	10					2,300	92
Flounders	5,080	178								
Gizzard shad					13,400	268				
Hickory shad					1,618	40				
Kingfish	1,900	91								
Mullet	24,600	676					3,000	$90		
Perch, white	300	12	9,500	475	6,700	350			9,200	485
Perch, yellow			15,700	566	2,500	90			7,000	280
Pike			850	85					1,000	100
Sea bass	150	6								
Shad					25,532	1,749			29,050	1,900
Spot	15,650	448					5,000	300		
Squeteague	94,000	2,706					2,000	80		
Striped bass			2,000	160	4,850	485			8,800	880
Suckers			150	3	2,000	40			3,400	68
Total	150,780	4,352	63,925	3,523	108,090	3,882	10,000	470	1,534,350	11,735
Grand total	35,268,780	75,202	63,925	3,523	108,090	3,882	10,000	470	1,534,350	11,735

STATEMENT, BY COUNTIES, OF THE YIELD OF THE SEINE FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Gloucester.		James City.		King George.		King William.		Lancaster.	
	Lbs.	Value.	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value.
Vessel fisheries:										
Menhaden									64,166,666	$120,312
Shore fisheries:										
Alewives, fresh			20,000	$200	44,000	$220	3,000	$30		
Carp			6,200	186			500	15		
Catfish					17,600	807	4,500	225		
Croaker	10,000	$400								
Flounders	5,000	200								
Gizzard shad			3,500	70						
Menhaden									500,000	937
Mullet	30,000	1,200								
Perch, white			11,400	684	6,800	408	2,000	100		
Perch, yellow					1,500	60				
Shad					875	45	1,950	97		
Spot	15,000	600								
Squeteague	12,000	480								
Striped bass			5,500	440	10,500	1,050	1,500	120		
Suckers			3,500	70			1,500	30		
Total	72,000	2,880	50,100	1,650	81,275	2,590	14,950	617	500,000	937
Grand total	72,000	2,880	50,100	1,650	81,275	2,590	14,950	617	64,666,666	121,249

Species.	Mathews.		Middlesex.		Nansemond.		New Kent.		Norfolk.	
	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Alewives, fresh							148,000	$1,110	800	$8
Black bass							700	70		
Bluefish									8,500	425
Catfish							6,400	320		
Croaker					10,250	$205			131,000	2,620
Flounders									3,000	60
Hogfish									5,100	510
Kingfish									13,800	750
Menhaden			44,000	$440						
Mullet	15,000	$450							3,500	75
Perch, white							6,800	544	9,050	354
Perch, yellow							3,800	120		
Pike							1,400	112		
Shad							15,500	750		
Spot					15,000	450			127,250	7,085
Squeteague					32,000	800			73,000	2,520
Striped bass							1,700	160		
Suckers							6,000	145		
Total	15,000	450	44,000	440	57,250	1,455	190,300	3,331	375,000	14,407

STATEMENT, BY COUNTIES, OF THE YIELD OF THE SEINE FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Northampton.		Northumberland.		Princess Anne.		Prince George.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Menhaden	24,160,000	$49,006	117,848,000	$258,562				
Shore fisheries:								
Alewives, fresh							20,000	$300
Black bass					50,000	$3,000	5,500	440
Bluefish	2,100	124			45,000	1,150		
Carp					25,000	625	22,500	675
Catfish					15,000	375	12,300	515
Croaker					43,000	860		
Flounders	1,900	76						
Gizzard shad							5,000	100
Kingfish	650	32						
Mullet					27,000	675	3,500	70
Perch, white					219,930	6,598	5,500	300
Perch, yellow					33,500	1,005		
Pike					13,350	801		
Shad							12,000	600
Spot	8,500	340			163,500	5,205		
Squeteague	76,385	3,426			83,500	4,410		
Striped bass	11,850	1,237					800	64
Sunfish					23,000	460		
Total	101,385	5,235			741,780	25,164	87,100	3,064
Grand total	24,261,385	54,241	117,848,000	258,562	741,780	25,164	87,100	3,064

Species.	Prince William.		Stafford.		Westmoreland.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Menhaden							241,292,666	$498,730
Shore fisheries:								
Alewives, fresh	56,000	$205	800,000	$4,000			2,357,910	10,348
Alewives, salted			80,000	1,250			294,640	3,650
Black bass	4,900	490	19,650	1,965			99,350	7,795
Bluefish			800	40	3,400	$166	59,800	1,905
Carp	3,000	120	5,450	327	300	9	73,565	2,248
Catfish	10,650	525	23,100	979	3,700	148	144,650	6,124
Croaker							202,100	4,298
Drum							500	10
Eels			2,500	100			5,000	202
Flounders							14,980	514
Gizzard shad							21,900	438
Hickory shad							1,618	40
Hogfish							5,100	510
Kingfish							16,350	873
Menhaden							544,000	1,377
Mullet							106,600	3,236
Perch, white	6,200	323	21,200	1,147	14,100	705	328,680	12,485
Perch, yellow	4,500	168	5,700	228	2,500	100	76,700	2,617
Pike	1,000	100	1,500	150			19,100	1,348
Sea bass							150	6
Shad	800	40	14,400	800			100,107	5,981
Spot							349,900	14,428
Squeteague			1,000	40	6,000	240	379,885	14,702
Striped bass	3,350	268	18,100	1,810	16,000	1,310	84,950	7,984
Suckers	2,500	50	6,000	120			25,050	526
Sunfish							23,000	460
Total	92,900	2,289	999,400	12,956	46,000	2,678	5,335,585	104,105
Grand total	92,900	2,289	999,400	12,956	46,000	2,678	246,628,251	602,835

STATEMENT, BY COUNTIES, OF THE YIELD OF THE LINE FISHERIES OF VIRGINIA IN 1904.

Species.	Accomac.		Charles City.		Elizabeth City.		Essex.		Gloucester.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value	Lbs.	Value
Vessel fisheries:										
Bluefish					10,000	$800				
Shore fisheries:										
Bluefish	500	$25			95,700	5,060				
Catfish							750	$23		
Croaker	35,900	827			35,000	700				
Drum	8,500	146								
Flounders	1,200	48								
Hogfish					15,000	1,200				
Kingfish	15,150	747								
Perch, white	1,000	45			10,500	420				
Sea bass	700	29								
Spot	3,700	185			20,000	1,400				
Squeteague	123,760	3,782			40,000	1,200				
Crabs, hard	193,600	1,783			1,138,333	27,400			181,800	$2,727
Turtles			1,400	$70						
Total	384,010	7,617	1,400	70	1,354,533	37,380	750	23	181,800	2,727
Grand total	384,010	7,617	1,400	70	1,364,533	38,180	750	23	181,800	2,727

Species.	Isle of Wight.		James City.		King William.		Lancaster.		Mathews.	
	Lbs.	Value.	Lbs.	Value	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:										
Catfish	400	$20	8,200	$328	5,450	$258				
Croaker	1,600	32								
Squeteague	832	25								
Crabs, hard					120,000	1,800	285,826	$4,937	840,000	$10,499
Turtles			2,000	100						
Total	2,832	77	10,200	428	125,450	2,058	285,826	4,937	840,000	10,499

Species.	Middlesex.		Nansemond.		New Kent.		Norfolk.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Croaker			3,200	$64			20,000	$400
Flounders			500	10			3,000	60
Hogfish							1,000	100
Perch, white			550	16				
Sheepshead							2,500	125
Spot							25,000	1,250
Squeteague			1,800	54			40,000	1,200
Crabs, hard	466,666	$6,250					1,491,250	35,550
Turtles					1,500	$75		
Total	466,666	6,250	6,050	144	1,500	75	1,582,750	38,685

Species.	Northampton.		Northumberland.		Princess Anne.		Prince George.		Stafford.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value
Shore fisheries:										
Bluefish	1,000	$50								
Croaker	26,500	680			26,650	$400				
Drum	18,500	545								
Flounders	520	26								
Hogfish					17,000	2,040				
Kingfish	3,200	128			7,550	37[illegible]				
Spot	8,500	425			35,000	4,200				
Squeteague	94,500	2,635			28,500	570				
Striped bass					8,300	498				
Crabs, hard	1,232,100	9,978	643,716	$9,381	690,625	14,162				
Terrapin							1,500	$75		
Turtles							1,000	50	2,000	$85
Total	1,384,820	14,467	643,716	9,381	813,625	22,248	2,500	125	2,000	85

STATEMENT, BY COUNTIES, OF THE YIELD OF THE LINE FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Surry.		Warwick.		Westmoreland.		York.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:										
Bluefish									10,000	$800
Shore fisheries:										
Bluefish							1,000	$50	98,200	5,185
Catfish									14,800	629
Croaker			41,000	$615			20,000	400	209,850	4,118
Drum									27,000	691
Flounders									5,220	144
Hogfish			2,000	160					35,000	3,500
Kingfish									25,900	1,253
Perch, white									12,050	481
Sea bass									700	29
Sheepshead									2,500	125
Spot			3,000	240			8,500	265	103,700	7,965
Squeteague			15,700	314			18,000	290	363,092	10,070
Striped bass	550	$44							8,850	542
Crabs, hard					120,496	$1,812	741,500	14,372	8,145,912	140,651
Terrapin									1,500	75
Turtles									7,900	380
Total	550	44	61,700	1,329	120,496	1,812	789,000	15,377	9,062,174	175,838
Grand total	550	44	61,700	1,329	120,496	1,812	789,000	15,377	9,072,174	176,638

STATEMENT, BY COUNTIES, OF THE YIELD OF THE GILL-NET FISHERIES OF VIRGINIA IN 1904.

Species.	Accomac.		Alexandria.		Caroline.		Charles City.		Chesterfield.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value	Lbs.	Value.	Lbs.	Value.
Alewives							2,400	$18	44,000	$880
Black bass							150	12		
Catfish							525	26		
Kingfish	200	$10								
Mullet	48,800	1,564								
Perch							650	52		
Pike							300	24		
Shad			99,350	$5,320	4,200	$240	175,362	9,140	66,000	3,300
Spot	700	35								
Squeteague	3,000	90								
Sturgeon	32,260	1,900					3,800	380		
Caviar	4,970	4,390					480	408		
Suckers							475	23		
Total	89,930	7,989	99,350	5,320	4,200	240	184,142	10,083	110,000	4,180

Species.	Essex.		Fairfax.		Gloucester.		Henrico.		Isle of Wight.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value	Lbs.	Value.	Lbs.	Value.
Alewives							95,400	$1,908		
Shad	31,500	$1,446	47,950	$2,300	5,250	$300	102,350	5,305	125,100	$7,830
Sturgeon									7,110	600
Caviar									390	292
Total	31,500	1,446	47,950	2,300	5,250	300	197,750	7,213	132,600	8,722

Species.	James City.		King and Queen.		King George.		King William.		Nansemond.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Alewives	1,600	$12	16,000	$160			14,000	$140		
Mullet									16,500	$495
Shad	101,200	7,450	73,937	3,168	9,187	$455	155,925	7,120	39,162	3,143
Total	102,800	7,462	89,937	3,328	9,187	455	169,925	7,260	55,662	3,638

STATEMENT, BY COUNTIES, OF THE YIELD OF THE GILL-NET FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	New Kent.		Norfolk.		Prince George.		Prince William.		Richmond.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value	Lbs.	Value.
Alewives	7,400	$74			10,000	$150	72,000	$360		
Black bass	400	32								
Catfish	1,200	60								
Croaker			8,800	$184						
Flounders			400	12						
Mullet			20,000	600						
Perch	1,350	108								
Pike	600	48								
Shad	149,535	6,556	22,350	1,830	129,800	6,800	7,825	337	48,685	$2,782
Squeteague			10,000	250						
Sturgeon					5,125	512				
Caviar					405	344				
Suckers	1,000	40								
Total	161,485	6,918	61,550	2,876	145,330	7,806	79,825	697	48,685	2,782

Species.	Stafford.		Surry.		Warwick.		Westmoreland.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value	Lbs.	Value.
Alewives	204,000	$1,020							466,800	$4,722
Black bass									550	44
Catfish									1,725	86
Croaker									8,800	184
Flounders									400	12
Kingfish									200	10
Mullet									85,300	2,659
Perch									2,000	160
Pike									900	72
Shad	3,500	150	66,406	$3,552	50,750	$2,900	1,600	$80	1,516,924	81,504
Spot									700	35
Squeteague									13,000	340
Sturgeon			7,560	756					55,855	4,148
Caviar			1,215	1,033					7,460	6,467
Suckers									1,475	63
Total	207,500	1,170	75,181	5,341	50,750	2,900	1,600	80	2,162,089	100,506

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FYKE-NET FISHERIES OF VIRGINIA IN 1904.

Species.	Accomac.		Alexandria.		Essex.		Fairfax.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Black bass			500	$50			4,500	$450
Carp			600	12	1,100	$22	1,700	49
Catfish			8,200	410	7,400	222	10,600	424
Eels			600	24			1,500	60
Flounders	400	$12						
Perch, white	3,250	168	3,800	190	2,500	125	4,300	233
Perch, yellow			6,300	189			4,300	157
Pike			500	50			1,000	100
Sea bass	150	9						
Striped bass	1,950	240			2,750	220	3,500	290
Suckers			1,200	24			4,750	95
Sunfish							300	9
Total	5,750	429	21,700	949	13,750	589	36,450	1,867

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FYKE-NET FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Gloucester.		Henrico.		Isle of Wight.		James City.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	15,000	$150						
Carp	5,600	56			7,500	$225	1,500	$75
Catfish	25,200	756	18,000	$900	35,100	1,065	6,500	260
Croaker	3,200	96			45,920	1,363		
Eels	3,000	90					1,000	80
Flounders	1,500	60			18,775	413		
Perch, white	8,500	425	3,000	180	12,487	990	2,350	188
Shad					2,550	215	4,000	300
Squeteague	6,500	195			27,000	811		
Striped bass	14,700	1,470			6,850	820	13,500	1,620
Total	83,200	3,298	21,000	1,080	156,182	5,902	28,850	2,523

Species.	King George.		King and Queen.		King William.		Middlesex.		Nansemond.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value	Lbs.	Value	Lbs.	Value
Shore fisheries:										
Alewives	4,000	$40	1,000	$10	5,400	$108			1,000	$20
Black bass	250	25								
Carp	2,000	40	200	6	2,560	41				
Catfish	17,700	536	4,300	154	8,450	253	1,500	$45	4,800	166
Croaker									9,500	190
Eels	200	6	600	18	800	24				
Flounders	800	32	200	8	800	32			2,000	40
Perch, white	7,750	403	1,150	61	2,300	115	3,000	150	3,900	156
Perch, yellow	800	37								
Pike	200	15								
Shad	1,250	65							11,112	953
Squeteague					1,200	24			5,500	165
Striped bass	11,525	922	1,500	134	1,800	180	3,200	320		
Suckers			400	8	3,800	38				
Total	46,475	2,121	9,350	399	27,110	815	7,700	515	37,812	1,690

Species.	New Kent.		Northampton.		Princess Anne.		Prince William.		Richmond.	
	Lbs.	Value	Lbs.	Value	Lbs.	Value.	Lbs.	Value.	Lbs.	Value
Shore fisheries:										
Alewives	500	$5							1,120	$11
Black bass							5,300	$530		
Carp							3,000	120	1,150	22
Catfish	1,500	45					11,700	550	5,700	183
Eels	200	8	600	$36			2,300	85		
Flounders	190	3								
Kingfish					3,600	$360				
Perch, white	200	10			1,000	20	3,300	198	2,350	117
Perch, yellow							7,100	284		
Pike							1,000	100		
Shad	300	15							315	18
Spots			800	24	12,250	612				
Squeteague					15,300	765				
Striped bass					2,500	250			3,125	250
Suckers	300	6					6,350	127		
Total	3,100	92	1,400	60	34,650	2,007	40,050	1,994	13,760	601

STATEMENT, BY COUNTIES, OF THE YIELD OF THE FYKE-NET FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	Stafford.		Warwick.		Westmoreland.		York.		Total.	
	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value.
Shore fisheries:										
Alewives							3,500	$35	31,520	$379
Black bass	7,500	$750							18,050	1,805
Carp	5,300	212			1,600	$64			33,810	944
Catfish	15,650	626	4,250	$149	2,100	84			188,650	6,828
Croaker							8,550	171	67,170	1,820
Eels					1,050	36			11,850	467
Flounders			300	6			1,300	39	26,175	645
Kingfish									3,600	360
Perch, white	8,700	522	550	30	6,000	335			80,387	4,616
Perch, yellow	10,300	412							28,800	1,079
Pike	2,100	210			1,500	82			6,300	557
Sea bass									150	9
Shad			700	40					20,227	1,606
Spot									13,050	636
Squeteague			525	15			9,700	271	65,725	2,246
Striped bass			475	47			3,875	360	71,250	7,123
Suckers	3,000	60							19,800	358
Sunfish									300	9
Turtles					900	62			900	62
Total	52,550	2,792	6,800	287	13,150	663	26,925	876	687,714	31,549

STATEMENT, BY COUNTIES, OF THE YIELD BY EEL POTS, SPEARS, AND MINOR APPARATUS IN THE SHORE FISHERIES OF VIRGINIA IN 1904.

Apparatus and counties.	Alewives.		Eels.		Shad.		Crabs, soft.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Eel pots and spears:								
Accomac			3,100	$181				
Essex			4,500	135				
Isle of Wight			2,000	100				
James City			4,500	360				
Northumberland			3,500	105				
Princess Anne			45,000	2,250				
Total			62,600	3,131				
Minor apparatus:								
Accomac							64,266	$2,984
Elizabeth City							4,000	300
Lancaster							74,200	5,565
Mathews							25,000	1,825
Middlesex							19,300	1,610
Nansemond	1,250	$38			6,562	$563		
Norfolk							14,400	1,080
Northumberland							117,200	9,592
York							7,200	540
Total	1,250	38			6,562	563	325,566	23,496
Grand total	1,250	38	62,600	3,131	6,562	563	325,566	23,496

STATEMENT, BY COUNTIES, OF THE YIELD BY EEL POTS, SPEARS, AND MINOR APPARATUS IN THE SHORE FISHERIES OF VIRGINIA IN 1904—Continued.

Apparatus and counties.	Terrapin.		Frogs.		Total.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Eel pots and spears:						
Accomac					3,100	$181
Essex					4,500	135
Isle of Wight					2,000	100
James City					4,500	360
Northumberland					3,500	105
Princess Anne					45,000	2,250
Total					62,600	3,131
Minor apparatus:						
Accomac	206	$245			64,472	3,229
Charles City			840	$180	840	180
Elizabeth City					4,000	300
James City			1,400	300	1,400	300
Lancaster					74,200	5,565
Mathews					25,000	1,825
Middlesex					19,300	1,610
Nansemond					7,812	601
New Kent			980	210	980	210
Norfolk					14,400	1,080
Northumberland					117,200	9,592
York					7,200	540
Total	206	245	3,220	690	336,804	25,032
Grand total	206	245	3,220	690	399,404	28,163

STATEMENT, BY COUNTIES, OF THE YIELD OF THE WEIR AND SLAT-TRAP FISHERIES OF VIRGINIA IN 1904.

Species.	Gloucester.		Henrico.		James City.		King and Queen.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:								
Alewives	5,000	$50	20,200	$404	6,000	$60	8,000	$80
Black bass			150	15				
Bluefish							75	5
Carp			6,900	197				
Catfish	3,000	90	8,200	410			5,700	171
Croaker	900	18					2,500	75
Eels	800	24					2,300	69
Flounders	500	20					200	8
Gizzard shad							2,000	20
Perch, white	1,200	60	5,300	265			350	17
Shad			350	20			1,400	60
Spot							100	5
Squeteague	1,250	25					5,500	110
Striped bass	1,500	150					5,200	520
Suckers			2,500	37				
Total	14,150	437	43,600	1,348	6,000	60	33,325	1,140

STATEMENT, BY COUNTIES, OF THE YIELD OF THE WEIR AND SLAT-TRAP FISHERIES OF VIRGINIA IN 1904—Continued.

Species.	King William.		Nansemond.		Total	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Shore fisheries:						
Alewives	14,000	$280			53,200	$874
Black bass					150	15
Bluefish	275	14			350	19
Carp			700	$28	7,600	225
Catfish	8,300	249	350	18	25,550	938
Croaker	3,000	60			6,400	153
Eels	1,500	45			4,600	138
Flounders	800	32			1,500	60
Gizzard shad	1,075	21			3,075	41
Perch, white	1,200	60	500	25	8,550	427
Shad	3,150	180	210	18	5,110	278
Spot	350	15			450	20
Squeteague	8,500	255			15,250	390
Striped bass	6,500	650			13,200	1,320
Suckers	1,520	30			4,020	67
Total	50,170	1,891	1,760	89	149,005	4,965

STATEMENT, BY COUNTIES, OF THE CATCH BY OYSTER DREDGES AND TONGS IN THE FISHERIES OF VIRGINIA IN 1904.

Counties.	Oyster tongs.					
	Market oysters from natural rock.		Market oysters from private beds.		Seed oysters from natural rock.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Accomac	84,630	$5,546	649,600	$63,736	528,850	$19,245
Elizabeth City	14,700	840			167,300	4,780
Essex	2,800	200			3,500	150
Gloucester	177,800	12,325			178,150	7,590
Isle of Wight	83,300	5,915			1,125,250	34,925
King William					112,000	4,800
Lancaster	53,900	3,850				
Middlesex	8,050	575				
Nansemond	639,100	42,905			863,450	27,850
Norfolk	1,888,530	125,124			740,803	24,779
Northampton	43,400	3,033	374,570	32,990	330,470	12,110
Warwick	123,312	7,063			709,800	23,574
York	409,325	23,390			489,650	16,379
Total	3,528,847	230,766	1,024,170	96,726	5,249,223	176,182
Shore fisheries:						
Accomac	1,115,415	90,756	2,992,269	293,468	1,890,140	63,315
Elizabeth City	462,658	30,991	1,087,968	77,712	750,400	26,800
Essex	157,500	13,500	633,003	54,257		
Gloucester	942,900	57,380	645,190	48,185	777,000	27,750
Isle of Wight	402,500	23,000	455,000	32,500	493,500	17,625
James City			248,500	21,300		
King George	60,375	3,881				
King and Queen	252,000	21,600	492,100	42,180		
King William	10,500	1,200				
Lancaster	1,325,100	94,650	835,100	66,430		
Mathews	847,000	63,800	383,600	41,850	70,000	2,500
Middlesex	1,635,200	116,800	1,089,900	92,650		
Nansemond	919,296	59,097	934,500	66,750	598,500	21,375
New Kent			70,000	6,000		
Norfolk	1,117,200	71,820	2,103,500	149,350		
Northampton	379,925	25,100	2,049,915	130,515	733,600	20,416
Northumberland	559,475	39,962	266,000	22,800		
Princess Anne			126,000	40,000	80,640	5,760
Richmond	294,000	25,200	674,800	57,840		
Warwick	378,000	21,600	532,700	37,050	756,000	27,000
Westmoreland	259,420	18,530				
York	1,036,000	60,200	1,505,000	114,700	1,793,750	60,012
Total	12,154,464	839,067	17,125,045	1,395,537	7,943,530	272,553
Grand total	15,683,311	1,069,833	18,149,215	1,492,263	13,192,753	448,735

STATEMENT, BY COUNTIES, OF THE CATCH BY OYSTER DREDGES AND TONGS IN THE FISHERIES OF VIRGINIA IN 1904—Continued.

Counties.	Oyster dredges.						Total.	
	Market oysters from natural rock.		Market oysters from private beds.		Seed oysters from natural rock.			
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:								
Accomac	1,110,760	$75,476	208,600	$19,360	36,680	$1,346	2,619,120	$184,709
Elizabeth City			1,961,939	140,138			2,143,939	145,758
Essex			35,000	2,500			41,300	2,850
Gloucester							355,950	19,915
Isle of Wight							1,208,550	40,840
King George	99,050	6,367					99,050	6,367
King William							112,000	4,800
Lancaster			455,000	39,000			508,900	42,850
Middlesex							8,050	575
Nansemond							1,502,550	70,755
Norfolk							2,629,333	149,903
Northampton	14,000	1,060	2,450	210	13,300	590	778,190	49,993
Northumberland	357,000	24,025					357,000	24,025
Warwick							833,112	30,637
Westmoreland	432,950	28,412					432,950	28,412
York							898,975	39,769
Total	2,013,760	135,340	2,662,989	201,208	49,980	1,936	14,528,969	842,158
Shore fisheries:								
Accomac	905,240	63,157	89,250	7,485			6,992,314	518,181
Elizabeth City							2,301,026	135,503
Essex							790,503	67,757
Gloucester							2,365,090	133,315
Isle of Wight							1,351,000	73,125
James City							248,500	21,300
King George	9,450	607					69,825	4,488
King and Queen							744,100	63,780
King William							10,500	1,200
Lancaster			87,500	7,500			2,247,700	168,580
Mathews							1,300,600	108,150
Middlesex							2,725,100	209,450
Nansemond							2,452,296	147,222
New Kent							70,000	6,000
Norfolk							3,220,700	221,170
Northampton							3,163,440	176,031
Northumberland	320,600	22,900					1,146,075	85,662
Princess Anne							206,640	45,760
Richmond							968,800	83,040
Warwick							1,666,700	85,650
Westmoreland	121,975	8,712					381,395	27,242
York							4,334,750	234,912
Total	1,357,265	95,376	176,750	14,985			38,757,054	2,617,518
Grand total	3,371,025	230,716	2,839,739	216,193	49,980	1,936	53,286,023	3,459,676

STATEMENT, BY COUNTIES, OF THE CATCH BY CLAM TONGS, HOES AND RAKES, AND CRAB SCRAPES AND DREDGES IN THE FISHERIES OF VIRGINIA IN 1904.

Fisheries and counties.	Clam tongs, hoes, and rakes.		Crab scrapes.		Crab dredges.	
	Clams, hard.		Crabs, soft.		Crabs, hard.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
Vessel fisheries:						
Accomac	142,200	$17,963				
Elizabeth City					1,602,240	$29,904
Norfolk					325,000	5,200
Northampton	21,320	2,330			282,900	3,820
Total	163,520	20,293			2,210,140	38,924
Shore fisheries:						
Accomac	a 968,900	124,538	1,585,088	$69,413		
Elizabeth City	112,000	16,800				
Gloucester	110,880	16,632				
Mathews	12,000	1,800				
Norfolk	12,800	2,400				
Northampton	78,032	8,054				
Princess Anne	6,400	1,200				
York	195,040	29,256				
Total	1,496,052	200,680	1,585,088	69,413		
Grand total	1,659,572	220,973	1,585,088	69,413	2,210,140	38,924

a Includes 34 bushels, or 340 pounds, of soft clams, valued at $39.

NOTES AND DETAILED STATISTICS OF THE PRINCIPAL FISHERIES.

Oyster.—In the oyster industry Virginia ranks first among the Middle Atlantic States in the quantity of oysters taken, but the value of the product is less than half that of the New York output. The total catch in 1904, including the product from natural rocks and private beds and the seed oysters, was 7,612,289 bushels, valued at $3,459,676. This sum is more than half the value of all other fishery products combined. The catch by vessels was 2,075,567 bushels, valued at $842,158; by boats in the shore fisheries 5,536,722 bushels, valued at $2,617,518. Compared with 1901, there appears a decrease of 273,158 bushels, but an increase of $536,220 in value. The decrease is more apparent than real in its relation to the actual supply, owing to the fact that the severe winter weather during part of the season of 1904–5 affected the quality of the oysters so that some of the planted stock was not worth taking from the beds, and the tonging season on the natural beds was curtailed to a considerable extent. The increase in value was due in part to the natural rise in the price of oysters, in keeping with other food products. During the winter months of 1904–5 the demand was great, and prices ranged from 50 cents to $1 per bushel for oysters tonged on the natural beds.

Oyster planting is a constantly growing feature of the oyster industry in Virginia. Each year the available area is enlarged, and rent is now collected on 59,029 acres, of which 13,190 acres are on the eastern, or ocean side, of Accomac and Northampton counties. The quantity of oysters taken from private beds in 1904 was 2,998,422

bushels, valued at $1,708,456. These figures represent oysters grown from spat and seed stock which have been on the beds from two to three years. In some instances leased bottoms have been used for bedding market oysters taken from natural rocks and placed on the beds to fatten, but as these oysters have been previously counted as from natural rocks, they are not included here.

The use of oyster shells for the collection of spat continues in great favor with planters, and the steady demand makes a good market for shells at 3½ to 4 cents a bushel.

There is a large market for seed oysters in the North, and the vessels of Isle of Wight County work almost entirely to supply this demand. The seed stock, from 6 months to 2 years old, is purchased at prices ranging from 20 to 27 cents a bushel, is planted, and left on the beds about 18 months. It is then taken up and shipped north, chiefly to New Jersey, where it is again bedded for a short time to fatten before being put on the market.

The demand for Lynnhaven Bay oysters is greater than the supply, and the prices paid are higher than for any other shell stock in the state. The output from the beds in 1904–5 was estimated at 8,000 barrels, or 18,000 bushels, valued at $40,000. The superiority of Lynnhaven oysters is due to the fact that more care is taken in their cultivation and fewer oysters are laid down in a given area.

The work of tonging and dredging from vessels and boats on natural rocks gives employment to over two-thirds of the persons engaged in the fishing industries of this state. The product from natural rocks in 1904 amounted in all to 4,613,867 bushels, valued at $1,751,220. Tonging begins in September and is actively continued until about December 25, after which date many of the men leave the grounds and hire out to planters to work on private beds, leaving about one-third of the original number to finish out the season on the natural rock.

Nearly all tonging connected with the vessel fisheries is done from skiffs. The latter are lap-streaked, made at Staten Island, N. Y., and cost about $125 each delivered at Norfolk. On a few vessels of small tonnage, tonging is done from the deck, no skiffs being used. Vessels are never licensed directly except for dredging. The license designates the number of boats to be carried and the number of tongs to be used. The vessel is used primarily as living quarters for the crew and also for the purpose of carrying the stock to market. Often two vessels work in company, one remaining on the grounds to furnish sleeping quarters for the crew while the other markets the stock.

The oystermen who tong from canoes own their boats, valued at from $150 to $600 each and often equipped with a gasoline engine. These men usually sell their catch to "buy-boats," which anchor on

the tonging grounds until a load is secured, thus offering the smaller boats an opportunity to sell their catch without having to lose the time in going to market. The area of natural rock has become so circumscribed that great effort is put forth in the early part of the season to reach the more available grounds, and every advantage is taken of time and methods of getting to market. Under these circumstances the "buy-boat" is always welcomed, and even though the price paid is slightly under the market rate, a gain is made by the time saved.

Statement by Counties of the Yield and Value of Oysters taken from Public and Private Areas in Virginia in 1904.

Counties.	Market oysters from natural rock.		Market oysters from private beds.		Seed oysters from natural rock.		Total.	
	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.
Accomac	459,435	$234,935	562,817	$384,049	350,810	$83,906	1,373,062	$702,890
Elizabeth City	68,194	31,831	435,701	217,850	131,100	31,580	634,995	281,261
Essex	22,900	13,700	95,429	56,757	500	150	118,829	70,607
Gloucester	160,100	69,705	92,170	48,185	136,450	35,340	388,720	153,230
Isle of Wight	69,400	28,915	65,000	32,500	231,250	52,550	365,650	113,965
James City			35,500	21,300			35,500	21,300
King George	24,125	10,855					24,125	10,855
King and Queen	36,000	21,600	70,300	42,180			106,300	63,780
King William	1,500	1,200			16,000	4,800	17,500	6,000
Lancaster	197,000	98,500	196,800	112,930			393,800	211,430
Mathews	121,000	63,800	54,800	41,850	10,000	2,500	185,800	108,150
Middlesex	234,750	117,375	155,700	92,650			390,450	210,025
Nansemond	222,628	102,002	133,500	66,750	208,850	49,225	564,978	217,977
New Kent			10,000	6,000			10,000	6,000
Norfolk	429,390	196,944	300,500	149,350	105,829	24,779	835,719	371,073
Northampton	62,475	29,193	346,705	163,715	153,910	33,116	563,090	226,024
Northumberland	176,725	86,887	38,000	22,800			214,725	109,687
Princess Anne			18,000	40,000	11,520	5,760	29,520	45,760
Richmond	42,000	25,200	96,400	57,840			138,400	83,040
Warwick	71,616	28,663	76,100	37,050	209,400	50,574	357,116	116,287
Westmoreland	116,335	55,654					116,335	55,654
York	206,475	83,590	215,000	114,700	326,200	76,391	747,675	274,681
Total	2,722,048	1,300,549	2,998,422	1,708,456	1,891,819	450,671	7,612,289	3,459,676

Clam.—The clamming industry of Virginia in 1904 produced a revenue to the fishermen of $220,973. The total catch in the state was 207,446 bushels. Nearly all of the clams are taken in the shore fisheries. The catch by vessels amounted to 20,440 bushels, taken in the waters of Accomac and Northampton counties. In recent years clamming has assumed great importance in these counties, the catch in 1904 being 151,306 bushels, valued at $152,885. Many persons in eastern Virginia find remunerative employment at clamming during most of the year, the prices ranging from $3.50 to $5 per thousand clams. The season in most localities is from April to August. In Norfolk and Princess Anne counties clams are scarce, the yield being only a few bushels caught by fishermen while not engaged in other fisheries. In Elizabeth City County about 80 men engaged in the fishery, using 15 pairs of patent tongs and 50 pairs of ordinary tongs, and the catch amounted to 14,000 bushels. In the vicinity of Poquosin and Grafton, in York County, clamming is profitable, 275 men finding

employment in digging and tonging. The catch is made in Poquosin and Back rivers and Chesapeake Bay, the output aggregating 16,000 bushels, valued at $19,200. In Gloucester County clams are taken in the Severn River and tributaries, York River, and Mobjack Bay. They are shipped by steamer to Baltimore from wharves on the Severn and York rivers. One hundred and seventy men were engaged in the fishery, and the catch amounted to 13,860 bushels, valued at $16,632. In Mathews County nearly all the clams were taken in the East and North rivers, 1,500 bushels constituting the entire catch.

Crab.—The crab fishery of Virginia has increased over 100 per cent in value since 1901, and each season adds to its importance. The total catch of hard and soft crabs in 1904 was 12,266,706 pounds, valued at $272,484, of which amount 1,910,654 pounds, valued at $92,909, was soft crabs, and the remainder hard crabs. The crabs numbered 36,800,118, of these 5,731,962 being soft crabs. The increase in 1904 over 1901 was 4,865,005 pounds, valued at $153,649, due largely to winter fishing for hard crabs with dredges. Ten vessels engaged in this business in 1904, eight of them fishing from Elizabeth City County. The catch by vessels was 2,210,140 pounds, valued at $38,924.

The soft-crab fishery of Virginia is especially important in the waters of Pocomoke and Tangier sounds. The catch is made principally with scrapes from May until the middle of October. The finest crabbing districts of the state are found in these waters, and many oystermen living on Tangier Island and the mainland of Accomac County support themselves almost entirely throughout the summer months by crabbing. The value of soft crabs caught in Accomac County was $72,397.

Shad.—The shad is one of the leading fisheries of Virginia, and in 1904 the catch was greater than in any of the other Middle Atlantic States. It amounted to 7,419,899 pounds, representing 2,081,851 fish, valued at $439,625, which compared with 1901 shows an increase of 447,687 pounds, worth $73,422, which was almost wholly in the catch by apparatus fished in the waters of Chesapeake Bay and tributaries. As in Maryland, the quantity of apparatus in these waters has been largely increased, greatly interfering with the fish on their way to the spawning grounds. The catch in the rivers shows a marked decline, especially in the Potomac, where the number fell from 648,462 in 1901 to 289,500 in 1904. The Chickahominy River, with its length of only 50 miles, was formerly noted for the great quantity of shad taken in its waters, and eight or ten years ago the annual catch averaged about 150,000 shad. In 1904 it was only 33,400. Nearly all the shad taken in the James and Rappahannock rivers are caught in gill nets, as is done in the Nansemond and Chickahominy.

NUMBER AND VALUE OF THE SHAD TAKEN IN THE FISHERIES OF VIRGINIA IN 1904.

Counties.	No.	Value.	Counties.	No.	Value.
Accomac	124,271	$24,005	Middlesex	45,000	$8,070
Alexandria	26,600	5,320	Nansemond	18,085	5,677
Caroline	2,700	540	New Kent	49,960	7,321
Charles City	55,970	10,889	Norfolk	14,000	4,880
Chesterfield	16,500	3,300	Northampton	4,910	982
Elizabeth City	103,671	23,910	Northumberland	494,700	108,300
Essex	17,700	3,030	Princess Anne	5,350	1,781
Fairfax	24,300	4,610	Prince George	37,000	7,400
Gloucester	206,075	51,444	Prince William	2,750	432
Henrico	26,625	5,325	Richmond	34,325	6,865
Isle of Wight	34,625	8,045	Stafford	5,350	1,006
James City	27,200	7,900	Surry	17,759	3,552
King George	25,800	4,786	Warwick	15,500	3,140
King and Queen	21,525	3,228	Westmoreland	10,250	2,040
King William	46,100	7,397	York	12,900	2,580
Lancaster	194,350	39,870			
Mathews	360,000	72,000	Total	[a]2,081,851	439,625

[a] Represents 7,419,899 pounds.

Menhaden.—The number of fish utilized in the menhaden factories in 1904 was 370,042,000, a decrease of 8,685,331 since 1901. An increase of 11 steamers is shown, making the total 32, valued at $481,500. The number of factories in operation was 21, an increase of 6, and the persons employed on vessels and in the factories was 1,708, a gain of 131. Four sailing vessels were reported fishing for menhaden in 1904. The employment of sailing vessels as transporters has ceased, owing to the wide range and scarcity of fish, and the steamers now bring their catch direct to the factories. Three years ago menhaden were so plentiful that many oystermen equipped their boats with purse seines and engaged in catching menhaden for the factories.

THE MENHADEN INDUSTRY IN VIRGINIA IN 1904.

Items.	No.	Value.	Items.	No.	Value.
Factories	21	$425,050	Steam vessels fishing	32	$481,500
Cash capital		215,350	Tonnage	2,686	
Wages paid factory employees		115,185	Outfit		111,554
Persons in factories	768		Sail vessels fishing	4	4,200
Persons on vessels	940		Tonnage	11	
Menhaden utilized	370,042,000	485,305	Outfit		3,095
Products:			Apparatus on vessels:		
Dry scrap (tons)	29,088	749,252	Seines (total length 15,461 yards)	54	39,905
Wet scrap (tons)	113	1,682			
Oil (gallons)	647,333	115,948			

WHOLESALE TRADE.

The wholesale trade in fishery products was represented by 110 firms in 1904, an increase of 30 since 1901. The value of establishments was $611,000, the number of persons engaged 4,701, the wages paid $674,196, and the amount of cash capital $595,750.

There were 83 firms engaged in the oyster business. Norfolk is the center of the oyster trade and oysters are shipped thence to many

points in the United States and Canada. A large portion of the stock is opened before shipment. In recent years there has been a large increase in the number of oyster establishments located at various points on the Rappahannock River and its tributary creeks. Large quantities of oysters, opened and in the shell, are shipped by steamer from wharves on the Rappahannock River to Baltimore, whence they are distributed to many other points.

Nine firms were engaged in preparing crab meat for shipment. One firm at Hampton engaged in canning crabs and three firms in Accomac County handled soft crabs. At Brighton, Northampton County, one establishment was engaged in canning clams and clam juice.

In the wholesale fish trade two firms handled fish exclusively and five others handled fish and oysters. A few firms handle all of the products.

The following table shows the persons and capital in the wholesale fishery trade of Virginia in 1904:

Number of Persons Employed and the Capital Invested in the Wholesale Fishery Trade of Virginia in 1904.

Localities.	Establishments.		No. of persons engaged.	Cash capital.	Wages paid.
	No.	Value.			
Chincoteague	4	$12,800	103	$18,500	$11,200
Saxis and Tangier Island	7	4,350	86	6,950	5,750
Cashville, Chesconessex, and Folly Creek	4	3,300	72	7,400	5,950
Franklin City, Messongo, and Hunting Creek	4	5,750	53	13,000	4,500
Mappsville, Parksley, and Dreka	3	2,650	69	7,200	3,950
Wachapreague and Wishart	3	4,200	84	8,500	6,350
Cape Charles and Brighton	6	7,050	50	7,600	5,150
Oyster and Nassawadox	2	1,250	37	2,000	1,700
Willis Wharf and Brownsville	4	4,950	130	5,700	5,310
Bayford, Bridgetown, and Franktown	3	1,100	54	2,300	2,450
Elizabeth City	12	112,600	917	118,200	99,366
Whealton and Bowlers Wharf	5	21,000	318	60,000	55,550
Irvington	3	7,300	127	12,900	21,000
Weems	2	2,650	83	9,000	12,800
Urbanna and Curitoman Point	4	21,250	157	16,500	15,360
Suffolk	2	6,450	105	7,500	8,500
Lewisetta, Mundays Point, Kinsale, and Mila	4	9,300	173	13,000	13,500
Sharps Wharf	7	4,100	97	14,000	8,550
Norfolk	21	290,300	1,231	171,000	249,000
Portsmouth and Berkley	6	71,250	512	48,000	98,300
West Point	4	17,400	243	46,500	39,960
Total	110	611,000	4,701	595,750	674,196

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THE COMMERCIAL FISHERIES OF THE PACIFIC COAST STATES IN 1904

By W. A. Wilcox

Agent, Bureau of Fisheries

Bureau of Fisheries Document No. 612

CONTENTS.

THE COMMERCIAL FISHERIES OF THE PACIFIC COAST STATES IN 1904.

By W. A. Wilcox,
Agent, Bureau of Fisheries.

INTRODUCTION AND GENERAL TABLES.

The most recent official canvass of the fishing industries of the Pacific Coast States was made by the Bureau of Fisheries in 1905, and furnished statistical and other data for the calendar year 1904 which are here published in detail. A condensed statement of the same information was issued in Statistical Bulletin No. 185, under date of August 31, 1906.

As new avenues of distribution have been opened the fishing industries of the Pacific coast have increased in importance and in 1904 represented an investment of $12,839,949 in capital, employed 19,658 persons, and yielded 168,599,676 pounds, valued at $6,680,866. The demand for both salt and fresh fish is constantly increasing. Formerly, canned salmon was used but little in eastern states, and most of the pack went to England. Pacific cod and fresh sea products were seldom seen outside the cities on the west coast. Now canned salmon is found in nearly every retail grocery store in the United States, and a large export trade continues. Cod taken and salted by vessels from California and Washington ports is now in demand all through the Pacific States, and many carloads annually go to Chicago, New York, Boston, and even to Gloucester, Mass. By means of express and refrigerator cars fresh salt-water fish, oysters, crabs, shrimp, and smelt are daily sent in large shipments from San Francisco, Los Angeles, San Diego, Seattle, and Tacoma to interior points in Colorado, Nevada, New Mexico, and Arizona.

The following tables show in general the extent of the fisheries of the west coast in 1904, together with a comparison of statistics for recent years:

Number of Persons Employed in the Fishing Industries of the Pacific Coast States in 1904.

How employed.	Washington.	Oregon.	California.	Total.
On vessels fishing	367	....	838	1,205
On vessels transporting	240	84	77	401
In shore and boat fisheries	5,467	3,525	3,491	12,483
On shore, in canneries, etc	2,755	1,690	1,124	5,569
Total	8,829	5,299	5,530	19,658

INVESTMENT IN THE FISHERIES OF THE PACIFIC COAST STATES IN 1904.

Items.	Washington.		Oregon.		California.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Vessels fishing	50	$134,600			37	$371,800	87	$506,400
Tonnage	1,541				6,096		7,637	
Outfit		66,418				223,479		289,897
Vessels transporting	80	261,300	35	$115,700	24	100,600	139	477,600
Tonnage	1,247		500		998		2,745	
Outfit		42,335		14,350		11,370		68,055
Boats, sail and row	3,448	309,610	1,820	213,395	1,798	218,220	7,066	741,225
Boats, gasoline	63	44,300	19	25,700	231	202,850	313	272,850
Apparatus—vessel fisheries:								
Seines					5	1,400	a 5	1,400
Paranzella nets					8	2,800	8	2,800
Gill nets	1	75			16	880	b 17	955
Beam trawls	9	571					9	571
Trammel nets					27	2,700	c 27	2,700
Lines		20,015				1,480		21,495
Hoop nets					19	29	19	29
Pots					130	180	130	180
Apparatus—shore fisheries:								
Seines	257	143,885	50	25,200	181	21,230	d 488	190,315
Pound nets	602	1,276,230					602	1,276,230
Gill nets	1,537	183,485	2,631	499,345	2,104	226,404	e 6,272	909,234
Trammel nets					1,042	55,730	f 1,042	55,730
Fyke nets	6	90	20	400	420	4,120	446	4,610
Paranzella nets					24	3,000	24	3,000
Shrimp nets					1,163	23,260	1,163	23,260
Hoop nets and traps	125	125	3,429	4,333	2,790	5,535	6,344	9,993
Reef nets	5	2,500					5	2,500
Dip nets	20	38					20	38
Wheels	19	52,000	30	116,000			49	168,000
Pots	2,744	3,464			2,525	3,716	5,269	7,180
Lines		895		50		6,062		7,007
Dredges, tongs, rakes, etc		6,525		83		523		7,131
Abalone outfit						1,251		1,251
Shore and accessory property		1,570,740		1,538,936		1,472,987		4,582,663
Cash capital		1,200,000		1,203,200		802,450		3,205,650
Total		5,319,201		3,756,692		3,764,056		12,839,949

a 913 yards. b 1,980 yards. c 2,400 yards. d 138,189 yards. e 1,697,545 yards. f 89,220 yards.

PRODUCTS OF THE FISHERIES OF THE PACIFIC COAST STATES IN 1904.

Species.	Washington.		Oregon.		California.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Albacore:								
Fresh					132,689	$1,606	132,689	$1,606
Salted					38,328	1,207	38,328	1,207
Barracuda:								
Fresh					1,943,159	44,200	1,943,159	44,200
Salted					216,123	7,620	216,123	7,620
Black bass	78,000	$1,310			15,500	1,600	93,500	2,910
Black cod	334,300	7,680					334,300	7,680
Bonito					212,062	3,075	212,062	3,075
Catfish	6,000	300	180,000	$6,000	737,144	20,992	923,144	27,292
Chub mackerel					134,992	3,666	134,992	3,666
Cod, salted	2,072,000	62,450			5,622,944	131,516	7,694,944	193,966
Croaker					121,340	3,145	121,340	3,145
Cultus cod	144,000	2,214			293,051	8,704	437,051	10,918
Flounders:								
Fresh	199,291	1,999			4,312,506	83 230	4,511,797	85,229
Salted					23,833	1,191	23,833	1,191
German carp			20,000	200	70,374	1,407	90,374	1,607
Halibut	12,066,000	357,180	25,000	1,750			12,091,000	358,930
Hardhead					65,000	2,220	65,000	2,220
Herring	531,750	3,155	18,420	608	1,426,442	15,833	1,976,612	19,596
Jewfish:								
Fresh					46,741	642	46,741	642
Salted					8,070	264	8,070	264
Kingfish					173,561	3,633	173,561	3,633
Mullet					12,952	423	12,952	423
Perch	149,000	2,880	4,210	126	209,272	6,860	362,482	9,866
Pompano					33,850	4,502	33,850	4,502

PRODUCTS OF THE FISHERIES OF THE PACIFIC COAST STATES IN 1904—Continued.

Species.	Washington.		Oregon.		California.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Rockfish:								
Fresh	82,700	$3,498	21,000	$630	1,765,824	$58,249	1,869,524	$62,377
Salted					26,943	1,032	26,943	1,032
Sacramento perch					11,343	554	11,343	554
Sacramento pike					9,500	380	9,500	380
Salmon:								
Blueback—								
Fresh	11,507,410	527,388	333,928	12,001	266,420	3,996	12,107,758	543,385
Salted					6,420	257	6,420	257
Chinook—								
Fresh	15,211,783	701,555	20,022,216	1,005,960	8,576,283	308,972	43,810,282	2,016,487
Salted					3,169,796	135,178	3,169,796	135,178
Dog	13,652,168	131,440	998,825	5,514			14,650,993	136,954
Silver—								
Fresh	26,021,187	503,021	4,255,393	82,956	266,006	5,483	30,542,586	591,460
Salted					3,210	129	3,210	129
Steelhead—								
Fresh	1,859,106	79,107	1,103,802	44,517	53,284	1,599	3,016,192	125,223
Salted					1,284	51	1,284	51
Sardines					1,036,470	11,811	1,036,470	11,811
Sculpin					2,670	53	2,670	53
Sea bass:								
Fresh			10,000	1,000	973,384	30,332	983,384	31,332
Salted					5,140	216	5,140	216
Sea trout					78,010	2,540	78,010	2,540
Shad	125,287	1,753	36,846	1,433	327,372	9,960	489,505	13,146
Skates					198,186	1,470	198,186	1,470
Smelts	1,370,322	26,903	24,938	739	1,362,442	52,106	2,757,702	79,748
Sole	9,000	180			3,873,515	68,912	3,882,515	69,092
Spanish mackerel:								
Fresh					615,063	8,634	615,063	8,634
Salted					93,402	3,070	93,402	3,070
Striped bass					1,570,404	92,116	1,570,404	92,116
Sturgeon	129,127	4,050	8,854	221			137,981	4,271
Surf-fish					119,060	4,652	119,060	4,652
Tomcod					69,400	2,776	69,400	2,776
Whitefish					270,091	3,092	270,091	3,092
Yellow-fin					15,000	340	15,000	340
Yellow-tail:								
Fresh					189,394	3,421	189,394	3,421
Salted					84,471	3,030	84,471	3,030
Other fish					19,110	301	19,110	301
Abalone, alive					797,000	7,199	797,000	7,199
Abalone meat					27,948	1,956	27,948	1,956
Abalone shells					8,730	218	8,730	218
Clams:								
Hard	774,568	54,512			96,440	10,566	[a] 871,008	65,078
Soft	132,500	8,650	31,390	3,071	139,690	18,334	[b] 303,580	30,055
Mussels					28,215	1,764	[c] 28,215	1,764
Oysters:								
Eastern	269,000	122,700			1,019,767	536,253	[d] 1,288,767	658,953
Native	1,069,461	279,312	6,944	1,488	300,524	91,770	[e] 1,376,929	372,570
Squid, dried					251,360	10,054	251,360	10,054
Crabs	723,080	22,962	246,266	4,398	5,110,560	154,739	6,079,906	181,829
Crawfish			187,200	12,480			187,200	12,480
Spiny lobster					1,078,065	43,406	1,078,065	43,406
Shrimp, dried					242,000	29,040	242,000	29,040
Shrimp in shell	429,750	26,104			640,000	38,400	1,069,750	64,504
Shrimp shells					950,000	4,390	950,000	4,390
Terrapin					25,500	2,512	25,500	2,512
Turtles					2,595	104	2,595	104
Whales		600						600
Whalebone	8,000	40,000			86,514	375,374	94,514	415,374
Whale oil					325,357	17,917	[f] 325,357	17,917
Sea lion					3,250	1,040	3,250	1,040
Seaweeds					59,320	2,267	59,320	2,267
Other products					7,989	13,590	7,989	13,590
Total	88,954,790	2,972,633	27,535,232	1,185,092	52,109,654	2,523,141	168,599,676	6,680,866

[a] 108,876 bushels.
[b] 30,358 bushels.
[c] 2,821 bushels.
[d] 184,109 bushels.
[e] 196,704 bushels.
[f] 43,381 gallons.

SUMMARY OF PERSONS ENGAGED, CAPITAL INVESTED, AND VALUE OF PRODUCTS OF THE FISHERIES OF WASHINGTON, OREGON, AND CALIFORNIA IN CERTAIN YEARS.

States.	1888.	1892.	1895.	1899.	1904.
Persons engaged:					
Washington	3,363	4,310	6,212	9,911	8,829
Oregon	3,619	4,332	6,323	5,643	5,299
California	4,684	5,403	4,770	3,974	5,530
Total	11,666	14,045	17,305	19,528	19,658
Capital invested:					
Washington	$1,261,078	$1,593,567	$2,024,469	$6,601,243	$5,319,201
Oregon	1,859,299	2,272,351	2,637,412	3,497,643	3,756,692
California	2,081,950	2,526,746	2,612,298	2,774,493	3,764,056
Total	5,202,327	6,392,664	7,274,179	12,873,379	12,839,949
Value of products:					
Washington	810,326	931,568	1,402,433	2,871,438	2,972,633
Oregon	733,867	872,405	1,284,136	855,750	1,185,092
California	2,465,317	3,022,991	1,786,479	2,551,451	2,523,141
Total	4,009,510	4,826,964	4,473,048	6,278,639	6,680,866

NOTES AND STATISTICS OF IMPORTANT INDUSTRIES.

SALMON.

In former years practically the entire catch of salmon was canned, but recently the demand for the mild-cured and frozen fish has grown until this feature of the industry has become an important business and its product has largely replaced canned salmon for the eastern trade, meeting still a growing demand, especially in Europe.

Only fish of the best quality and largest size are used for mild curing. They are dressed by slivering the sides from the backbone, are then thoroughly washed and rubbed with salt, and packed, with salt between the layers, into tierces holding 800 pounds each. The packed tierces are at once put into cold storage or refrigerator cars until wanted for shipment, when they are sent by fast freight to the eastern market. Salmon thus prepared is used chiefly for smoking, and much of it is now sold in New York and other eastern cities for ultimate use in sandwiches, after the German custom.

The use of such large quantities of salmon for mild curing has greatly reduced the pack of the canned product, and has increased the price paid the fishermen from 50 to 75 per cent during the past few years. In 1904 for chinook salmon weighing 20 pounds or more the fishermen received 6 to 7, and in some cases 8 cents a pound as the fish came from the water. The smaller fish brought 4 to 5 cents a pound. These are high prices compared with the 3 to 4 cents a pound paid a few years ago. Many canneries now combine with canning the packing of mild-cured salmon, thereby utilizing both large and small fish.

OUTPUT OF SALMON IN 1904.

During 1904 the market took 9,905,484 pounds of mild-cured salmon, valued at $1,119,912, and 5,894,162 pounds of fresh frozen salmon, valued at $345,692, or a total of 15,799,646 pounds, valued at $1,465,-604. In addition, 4,640,810 pounds of salmon were sold salted, and 346,000 pounds smoked.

The salmon canned in 1904 amounted to 857,232 cases, valued at $4,157,242, against 1,417,360 cases, valued at $6,139,032, in 1899. This large decrease, of 560,128 cases, or 36,408,320 pounds gross weight, is about half made up by the increase in the output of mild-cured and fresh frozen salmon.

Washington.—The salmon pack of Washington in 1904 amounted to 518,990 cases, valued at $2,378,801, compared with 1,041,883 cases in 1899, valued at $4,275,329. There were 27 canneries, which paid wages amounting to $354,146. The pack of mild-cured salmon amounted to 2,099,851 pounds, valued at $217,585, and the amount of fresh frozen salmon handled was 3,158,970 pounds, valued at $178,300. The refuse from the salmon canneries at Anacortes was utilized at oil and fertilizer works, producing 270 tons of fish scrap or fertilizer, valued at $7,560, and 25,000 gallons of fish oil, valued at $7,000.

The mechanical part of salmon canning has from almost the beginning been performed by Chinese, who, being quiet, industrious, and cleanly, give satisfaction. Before the season opens the canners contract with Chinese agencies to pack a given number of cases at a fixed price per case. This implies taking the fish as put on the dock and doing all the work until they are labeled, packed, and ready for shipment. In recent years prices have been increased by the contractors, and in 1904 reached 35 to 50 cents per case of forty-eight 1-pound cans each. The canneries furnish the living quarters for their employees, and the men their bedding and provisions. Of late years Chinese labor has been growing scarce, and is partly replaced by Japanese, furnished by the contractor or employed by the canner. A foreman with a few white assistants oversees the work. The Chinese and Japanese work side by side quietly, having no trouble, and carrying on little conversation not connected with their work. Outside of working hours they do not associate.

Oregon.—The salmon catch shows little variation, in 1904 yielding 320,435 cases after canning, a decrease of 20,862 cases compared with the 341,297 in 1899. There were 21 canneries in 1904, a falling off of 7 since 1899, of which 10, including 6 at Astoria, were operated on the Columbia River and the remainder on smaller rivers of the state. The total Columbia River pack of salmon in Oregon was 221,561 cases; that of the other rivers 98,874 cases.

The decrease in canned salmon, however, has been more than made up in this state by the large increase in the pack of mild-cured salmon from 1,546,756 pounds in 1899 to 5,219,193 pounds in 1904. The shipments of fresh frozen salmon show a decrease of 67,220 pounds from 2,448,608 pounds in 1899 to 2,381,388 pounds in 1904. In the latter year, however, 51,000 pounds were smoked and 273,950 pounds pickled, which makes a total gain of 3,930,167 pounds of salmon other than from the canneries. The wages paid by canneries amounted to $215,892, by cold-storage and mild-curing plants $62,124, by wholesale dealers $38,430, or a total of $316,446.

California.—The salmon fisheries of California present an interesting difference from those of Washington and Oregon in the fact that through restrictive legislation and artificial propagation the supply has

been maintained in the face of most unfavorable conditions. All of the streams stocked show an increasing yield. The product of the state in 1904, including salmon canned, salted, and sold fresh, amounted to 12,342,703 pounds, valued at $455,665. The catch in 1899 was 7,283,245 pounds, with a value of $262,195.

STATEMENT OF THE QUANTITY AND VALUE OF MILD-CURED, SALTED, FRESH FROZEN, AND SMOKED SALMON PREPARED IN WASHINGTON, OREGON, AND CALIFORNIA IN 1904.

Species.	Washington.		Oregon.		California.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Mild-cured salmon:								
Chinook	2,099,851	$217,585	5,219,193	$658,381	2,586,440	$243,946	9,905,484	$1,119,912
Salt salmon:								
Blueback, or sockeye					3,000,000	129,000	3,000,000	129,000
Chinook			78,000	2,860			78,000	2,860
Dog, or chum	1,066,000	20,540					1,066,000	20,540
Silver	226,000	9,147	195,950	5,980	74,860	3,593	496,810	18,720
Total	1,292,000	29,687	273,950	8,840	3,074,860	132,593	4,640,810	171,120
Fresh frozen salmon:								
Blueback, or sockeye	153,500	9,245					153,500	9,245
Chinook	530,090	42,456	12,025	601	353,804	14,152	895,919	57,209
Dog, or chum	902,560	35,860	7,500	75			910,060	35,935
Silver	1,186,175	59,749	1,152,230	58,874			2,338,405	118,623
Steelhead	386,645	30,990	1,209,633	93,690			1,596,278	124,680
Total	3,158,970	178,300	2,381,388	153,240	353,804	14,152	5,894,162	345,692
Smoked salmon	57,000	5,400	51,000	6,180	238,000	39,540	346,000	51,120
Grand total	6,607,821	430,972	7,925,531	826,641	6,253,104	430,231	20,786,456	1,687,844

STATEMENT BY WATERS OF THE SALMON PACK OF WASHINGTON, OREGON, AND CALIFORNIA IN 1904.

States and waters.	Canneries.	Employees.	Value of canneries.	Cash capital.	Total investment.
Washington:					
Puget Sound	13	1,219	$814,696	$443,000	$1,257,606
Columbia River	10	671	388,139	255,000	643,139
Grays Harbor and Willapa Bay	4	163	45,000	57,000	102,000
Total	27	2,053	1,247,835	755,000	2,002,745
Oregon:					
Columbia River	10	993	885,314	705,000	1,590,314
Nehalem River	1	40	25,000	20,000	45,000
Tillamook River	1	48	30,000	20,000	50,000
Siletz River	1	34	9,000	10,000	19,000
Yaquina River	1	21	4,000	5,000	9,000
Alsea River	1	39	10,000	10,000	20,000
Siuslaw River	1	24	6,875	5,000	11,875
Umpqua River	1	36	22,375	20,000	42,375
Coos Bay	1	39	4,000	7,000	11,000
Coquille River	2	54	15,200	18,000	33,200
Rogue River	1	38	55,651	30,000	85,651
Total	21	1,366	1,067,415	850,000	1,917,415
California:					
Sacramento River	2	108	87,500	50,000	137,500
Klamath River	1	27	19,050	10,000	29,050
Total	3	135	106,550	60,000	166,550
Grand total	51	3,554	2,421,800	1,665,000	4,086,710

STATEMENT BY WATERS OF THE SALMON PACK OF WASHINGTON, OREGON AND CALIFORNIA IN 1904—Continued.

States and waters.	Chinook.		Blueback, or sockeye.		Silver.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
Washington:						
Puget Sound	14,441	$69,352	109,264	$653,871	118,127	$447,851
Columbia River	118,915	719,046	3,647	21,682	27,638	103,320
Grays Harbor and Willapa Bay	7,339	32,163			22,304	80,294
Total	140,695	820,561	112,911	675,553	168,069	631,465
Oregon:						
Columbia River	201,463	1,225,644	9,264	56,366	3,616	15,037
Nehalem River	500	2,500			5,000	20,000
Tillamook River					4,400	17,600
Siletz River	1,000	5,000			3,300	13,200
Yaquina River	50	200			2,600	8,840
Alsea River	1,000	5,000			6,500	26,000
Siuslaw River	500	2,500			6,500	26,000
Umpqua River	500	2,500			9,500	38,000
Coos Bay	2,033	7,725			7,200	24,480
Coquille River	600	2,400			13,686	54,744
Rogue River	16,000	64,000			3,255	11,392
Total	223,646	1,317,469	9,264	56,366	65,557	255,293
California:						
Sacramento River	14,407	66,936				
Klamath River	3,400	18,360				
Total	17,807	85,296				
Grand total	382,148	2,223,326	122,175	731,919	233,626	886,758

States and waters.	Dog, or chum.		Steelhead.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
Washington:						
Puget Sound	49,656	$124,254			291,488	$1,295,328
Columbia River	20,293	51,691	3,050	$15,555	173,543	911,294
Grays Harbor and Willapa Bay	24,316	59,722			53,959	172,179
Total	94,265	235,667	3,050	15,555	518,990	2,378,801
Oregon:						
Columbia River	400	1,000	6,818	33,337	221,561	1,331,384
Nehalem River	6,000	12,000			11,500	34,500
Tillamook River	6,500	13,000			10,900	30,600
Siletz River	1,000	2,000			5,300	20,200
Yaquina River	450	1,080			3,100	10,120
Alsea River	300	600			7,800	31,600
Siuslaw River					7,000	28,500
Umpqua River	500	1,000			10,500	41,500
Coos Bay					9,233	32,205
Coquille River					14.286	57,144
Rogue River					19,255	75,392
Total	15,150	30,680	6,818	33,337	320,435	1,693,145
California:						
Sacramento River					14,407	66,936
Klamath River					3,400	18,360
Total					17,807	85,296
Grand total	109,415	266,347	9,868	48,892	857,232	4,157,242

COMPARATIVE SUMMARY, BY STATES, OF THE NUMBER OF CASES OF SALMON CANNED IN THE PACIFIC COAST STATES IN CERTAIN YEARS.

States.	Chinook.	Blue-back.	Silver.	Steel-head.	Dog.	Hump-back.	Total.
1892—Washington	134,253	19,441	28,708	26,945	29,411	....	238,758
Oregon	237,684	51,106	60,293	45,403	....	....	394,486
California	14,334	....	1,550	....	....	....	15,884
Total	386,271	70,547	90,551	72,348	29,411	....	649,128
1893—Washington	129,078	55,237	31,707	25,663	23,480	17,530	282,695
Oregon	176,024	23,074	62,913	39,563	9,230	....	310,804
California	26,436	....	500	....	....	....	26,936
Total	331,538	78,311	95,120	65,226	32,710	17,530	620,435
1894—Washington	156,549	53,717	32,118	23,209	33,952	9,049	308,594
Oregon	216,507	25,523	100,087	38,829	3,162	....	384,108
California	31,663	....	500	....	....	....	32,163
Total	404,719	79,240	132,705	62,038	37,114	9,049	724,865
1895—Washington	157,187	70,304	81,957	18,985	48,686	23,633	400,752
Oregon	316,284	12,854	138,981	30,693	27,027	....	525,839
California	28,635	....	400	....	....	....	29,035
Total	502,106	83,158	221,338	49,678	75,713	23,633	955,626
1899—Washington	95,147	503,950	145,139	2,258	42,656	252,733	1,041,883
Oregon	214,821	19,665	78,730	9,736	18,345	....	341,297
California	34,180	....	....	....	....	....	34,180
Total	344,148	523,615	223,869	11,994	61,001	252,733	1,417,360
1904—Washington	140,695	112,911	168,069	3,050	94,265	....	518,990
Oregon	223,646	9,264	65,557	6,818	15,150	....	320,435
California	17,807	....	....	....	....	....	17,807
Total	382,148	122,175	233,626	9,868	109,415	....	857,232

HALIBUT.

The halibut fleet consisted of 36 small vessels of from 6 to 42 tons, with crews of from 5 to 7 men each; 2 steamers, and 1 gasoline launch. Of these vessels 32 hail from Seattle, 2 from Tacoma, and 1 each from Port Townsend and Ballard. The 2 steamers hail from Tacoma and the gasoline launch from Seattle.

During the summer the halibut vessels fish off the southwest and northeast coasts of Washington and in the Strait of Juan de Fuca. During the last of September and early in October a large number of them leave for Alaskan waters, to fish in Chatham Strait, Frederick Sound, and occasionally in Icy Strait.

They return home from Alaska between the middle of February and early part of March and continue fishing on grounds off the coast of Washington. The fishermen work on shares, the crew paying for the provisions and ice, and the vessel furnishing the fishing gear except in some cases, when a small charge is made for the latter. After the expenses are paid the vessel draws one-fifth of the stock and the crew the balance. The catch in Alaskan waters is packed in 500-pound boxes and sent by steamer to Seattle.

The vessels took from off the coast of Washington and in the Strait of Juan de Fuca 4,625,000 pounds, and from Alaskan waters 3,349,000

pounds. Four hundred and forty-two thousand pounds were taken with small boats off the coast of Washington. The 3 steamers took 3,800,000 pounds from Alaskan waters. The resulting total, therefore, is 5,067,000 pounds of halibut from off the coast of Washington, and 7,149,000 pounds from Alaskan waters, or a grand total of 12,216,000 pounds, valued at $361,680. This value is an average of nearly 3 cents a pound to the fisherman.

COD

Washington.—The quantity of cod salted by vessels is gradually increasing. In 1904, 2 vessels from Anacortes and 2 vessels from Seattle landed a total of 2,072,000 pounds, having a value of $62,450. This is an increase from the catch in 1899, which was 930,000 pounds, valued at $23,250, landed by 2 vessels. The fish are taken on the cod banks of Alaska with trawls and hand lines operated from dories. There is a "dressing gang" on board, hired for that purpose, and the fish are kenched in the hold of the vessel.

The lay of the crew varies somewhat from that of Atlantic coast vessels. The vessel furnishes the gear, bait, and provisions. The captain receives $125 per month; the first mate $40 per month and $40 per 1,000 for all fish caught by him; the second mate $35 per month and $35 per 1,000 for fish caught by him, and the fishermen $25 to $30 per 1,000 fish taken by them. A "dressing gang" of four, who do not leave the vessel, receive $25 per month and $25 per 1,000 for the fish they catch from the vessel while waiting for the return of the fishermen. The splitter and the salter receive $75 a month each.

On arriving at the home port the fish are placed in pickle in wooden vats until such time as needed. They are then dried on flakes in the open air, taken to the packing room, where the skins and bones are removed, and pressed into bricks and packed as boneless cod, to be shipped to various parts of the country. A small quantity are hard dried and shipped whole.

California.—The cod fishery of California, centering at San Francisco, suffered from the severe storms in Bering Sea in 1904, and the catch of 5,622,944 pounds was somewhat less than in 1899. The demand for salt codfish on the Pacific coast shows a steady gain, due in part to an improvement in the quality, to the care exercised, and the condition in which the product is placed on the market.

Besides employing a fleet of vessels, the San Francisco cod firms have fishing stations in Alaska supplied with salt and stores from which the vessels can draw, and a crew remains at each station to fish from dories on local grounds. Stands for dressing the catch and houses for curing it are built on shore, where the fish remain until the end of the season, then to be loaded into transports and taken to the home port.

The vessels employ practically the same methods in curing and preparing the fish as on the Atlantic coast, with the exception that, instead of first salting the fish in hogsheads, large tanks are used. The fish are put up in various ways, such as in 1 and 2 pound bricks, boneless, in fancy boxes, etc.

SARDINES.

Sardines are always unreliable as to their movements, all along the coast from Mexico to British Columbia; for one or several years they may be very plentiful at one point, but the next year few or none may be seen. This uncertainty has discouraged effort to establish canneries, though one Los Angeles firm located at San Pedro has continued packing for several years, meeting with a good demand from Chicago, Boston, New York, and other eastern cities, at prices equal to those of the European pack.

The catch in 1904 was made with purse seines by a gasoline steamer which cruised all the season between San Monico and Redondo and occasionally as far north as Santa Barbara and off the islands of Santa Catalina and Santa Cruz. Besides the sardines the steamer took 426,300 pounds of Spanish mackerel, the latter being used at the cannery to help out the season's pack, which amounted to 4,292 cases of sardines and 5,834 cases of other fish.

INTRODUCED FISHES.

The original and present spawning grounds of the shad in California are at the outlets of the Sacramento and San Joaquin rivers, the only streams in this state in which these fish are numerous. They are quite plentiful in the Columbia River, and are taken in seines with the salmon, but as a food fish they are not highly prized in this region, and no special effort is made to take them. During the early catch there is a small demand in Portland at 5 and 6 cents a pound, but as the season advances the price drops to 2 and 3 cents a pound, when the fishermen will not bother with them, either throwing them on the land or returning them to the river. Puget Sound and the coast rivers that first reported shad in small numbers some ten years ago now yield no increase in the catch. In California, also, within the past few years the amount of shad marketed shows a large decrease. At one time these fish were found in the San Francisco market at all seasons of the year, but they are now seldom seen during the winter months, and their value has decreased from 8 and 10 to 2 and 3 cents a pound, a price that does not justify fishermen in sending them to market by express with their catch of salmon and striped bass.

Striped bass, introduced on this coast by the government, have practically confined their range to waters adjacent to the Sacramento and San Joaquin rivers, in which they were first placed. With the aid of

strict enforcements of state laws for the protection of this species, the catch continues to show an increase. Its fine qualities are fully appreciated, and the demand is often difficult to fill. The fish vary in weight from 5 to 60 pounds, and average 6 to 10 pounds.

German carp are very plentiful in most of the fresh waters of the coast. The dislike for them increases, and market men do not care to handle them. When they do it is at 1 or 2 cents a pound, a price that is no inducement to the fishermen, who, as a rule, destroy them.

Catfish, another introduced species, meets with a constantly growing demand, the catch of 1904 showing an increase of 271,232 pounds since 1899.

Comparative Statement of the Catch of Introduced Fishes in the Pacific Coast States in 1899 and 1904.

Species.	Washington.				Oregon.			
	1899.		1904.		1899.		1904.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Shad	85,000	$1.275	125,287	$1,753	32,000	$320	36,846	$1,433
Carp	....	....	....	....	....	....	20,000	200
Catfish	105,700	2,114	6,000	300	54,360	1,087	180,000	6,000
Total	190,700	3,389	131,287	2,053	86,360	1,407	236,846	7,633

Species.	California.				Total.			
	1899.		1904.		1899.		1904.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Striped bass	1,234,320	$61,814	1,570,404	$92,116	1,234,320	$61,814	1,570,404	$92,116
Shad	1,137,801	14,303	327,372	9,960	1,254,801	15,898	489,505	13,146
Carp	283,514	2,400	70,374	1,407	283,514	2,400	90,374	1,607
Catfish	465,911	12,734	737,144	20,992	625,971	15,935	923,144	27,292
Total	3,121,546	91,251	2,705,294	124,475	3,398,606	96,047	3,073,427	134,161

OYSTERS.

Washington.—In Washington the yield of oysters has increased since 1899, and native oysters show the benefit of cultivation by an increase in size, improved quality, and greater abundance. All oyster beds not owned by private parties are now reserved by the state for seed oysters, which are sold for planting at 25 cents per bushel. The state now holds 15,683,944 acres. Private oyster grounds are valued at $200 to $1,000 an acre, or an average of $600. Natural grounds exist chiefly in Pacific, Thurston, and Mason counties. Eastern oyster seed are planted on the same grounds with the native, and also in Samish Bay, Skagit County.

The oyster beds are worked throughout the year, but least during the summer months. The employees are Chinese, Indians, and a few Japanese. Oysters are gathered mostly by hand when exposed at low tide. House boats are anchored close by. and to these the oysters

are taken, culled, and packed for shipment in sacks holding 115 pounds each, gross weight. The men receive $1 per sack for culling and 40 cents per gallon for opening oysters.

The growth of eastern oysters planted in Washington waters has been slow, but the future holds good prospects of their outnumbering the native stock. In 1894 the United States Fish Commission planted 80 barrels of eastern seed oysters in Willapa Bay, and this planting demonstrated the possibility of acclimatization. During the next few years several attempts were made by private parties to introduce seed oysters from the Atlantic States. In 1897 the Toke Point Oyster Company gave the matter more attention, and since then, when seed could be procured at reasonable prices, made other plantings. This company is now receiving large returns from its investment, and its success has caused other firms to engage in the business.

The coldness of the waters of the northwest coast is unfavorable for the propagation of the eastern oyster, and necessitates a constant restocking with fresh seed from the Atlantic coast at a heavy expense. The cost of transportation of a carload is about $600. The seed are from 1 to 2 years old, and are taken mostly from beds in Long Island Sound. They are shipped in refrigerator cars holding from 150 to 200 barrels, the cars being iced in transit and going by fast freight. If the stock leaves its starting point in good condition the loss in transit is small.

Up to 1900 very few eastern oysters had been taken up for shipment, but during the past few years the quantity has increased, and in 1904 amounted to 38,428 bushels, some being shipped as far as Los Angeles and San Francisco. The value of these was $122,700. The entire product amounted to 152,780 bushels, valued at $279,312, a large increase since 1899, when only 98,355 bushels, valued at $174,567, were taken up.

Oregon.—A small bed of native oysters, located on the Yaquina River a few miles above its mouth, has for years been the only source of oyster supply in Oregon. During the past ten or fifteen years several attempts have been made to introduce eastern oysters, but the few sacks planted were stolen from the beds. In 1902 and 1903 another attempt was made, however, and this has proved a success. Three carloads, or 460 barrels, of eastern seed oysters were planted in the river during 1904, and this is the only place on the Pacific coast where the young from eastern seed have been reported as surviving in any numbers. The area of this oyster ground is small, but it may become a seed-raising place for future use.

California.—The California oyster grounds continue to furnish eastern and native oysters, both in the shell and opened, the supply of eastern oysters being kept up by the yearly planting of 1 and 2 year old seed brought from the Atlantic coast. The business showed a

decrease in 1904, however, due in part, it is claimed, to rumors of sewage pollution in San Francisco Bay. At the time of this canvass the proposed official investigation of these waters had not been made, and no ill effects from the consumption of the oysters had been proved. The shipment of oysters from Willapa Bay, Washington, the product of eastern seed, is considered another factor in diminishing the demand for San Francisco oysters.

Clams.—The output of clams from Washington in 1904 shows an increase of more than 100 per cent since 1899. In that year the yield was 48,174 bushels, valued at $23,248; in 1904 it was 109,250 bushels, valued at $54,512. Clams are dug principally by Indians. Kitsap County leads in the product, with 56,250 bushels, taken by 40 Indians, who sold them at Seattle for $31,050. These are all small, hard clams, some of which were used locally and the remainder shipped to various parts of the interior.

The Indians of Clallam County sold to the clam cannery at Port Williams 2,400 bushels of hard clams, for which they received $1,020. This cannery put up 1,600 cases. At Westport, Chehalis County, 500 cases were packed; a small cannery at Olympia, Thurston County, canned 300 cases, and a cannery at Friday Harbor, Island County, packed 3,000 cases, making the total pack of hard clams in Washington 5,400 cases.

Razor clams (tabulated under soft clams) are very plentiful on all the beaches of Chehalis County. Soft clams (*Mya arenaria*) are also plentiful, and an experiment of packing them was made at Aberdeen in 1905, though prior to this date they had not been utilized. The Aberdeen factory packed 8,000 cases of razor clams in 1904.

The total output of hard clams from the Pacific States in 1904 was 871,008 pounds, or 108,876 bushels, valued at $65,078; of soft clams 303,580 pounds, or 30,358 bushels, valued at $30,055.

ABALONE.

The abalone fishery, which is confined to the coast of southern California, in 1904 yielded 797,000 pounds of the live product, valued at $7,199; 27,948 pounds of abalone meat, worth $1,956; 8,730 pounds of shells, valued at $218, and $1,500 worth of pearls, these figures representing the sales of the fishermen. The principal part of the output is from Point Lobos, in Monterey County, where there is a small canning plant, which in 1904 put up 60 cases for local use, 200 cases for the Japanese market, 400 for the Chinese, and prepared 48,000 pounds of dry abalone and 44,000 pounds of shells. This plant has an American manager and employs 12 Japanese. Abalones are found in abundance off the point, and the species which grows here, that with the red shell, is considered superior in flavor to the black or white abalone, and when cooked brings a higher price. The abalones are pried from

the rocks by Japanese divers, who use home-manufactured diving suits, in 6 to 14 fathoms of water, and work in shifts of four hours each. The men are paid $15 per month and a percentage on the business, and are also given any shells they may wish to polish, and any pearls that may be found. Pearls vary in size from that of bird shot to buckshot, and are a dark lead or blue color. Some are from one-fourth to one-half inch in circumference, and very irregular in shape. The small ones have very little value, but those as large as buckshot are valued by dealers at from $60 to $70 each, and the large irregular ones bring different prices, according to size and color. A few have been sold for several hundred dollars each. One taken in 1904 was sold for $2,500. Pearls are not found in abundance, however, and the number taken and value received is kept secret by the fishermen. The possibility of finding a large and valuable pearl is the reason the Japanese will work for such small wages.

Abalones are canned also at East San Pedro, in Los Angeles County. The output of this establishment in 1904 was 821 cases in 2-pound cans (4 dozen to the case), 19 cases of minced abalone meat in 1-gallon cans, 330 cases in 1-pound cans, and 55 cases of sliced abalone in 1-gallon cans.

Two men at Pigeon Point, San Mateo County, took 75,000 pounds of abalone, packing 250 cases containing 48 one-pound cans each.

In packing abalones for market the meat is first soaked for three days in cold water to which salt has been added. If for American use, the meat is minced with fresh water added, packed and sealed in 1-pound cans, and cooked for one-half hour. The cans are then vented and again sealed and cooked for two hours under 10-pound pressure. The 1 and 2 pound cans meet with a good demand as "rock clams", under which name they are labeled. The first that were canned were labeled "abalone", but there was little or no demand for a product so little known. For the Japanese market abalones are cut into several pieces and packed in the cans with a sauce that is specially imported for the purpose from Japan. For the Chinese market they are placed in the cans whole, with a covering of fresh water, and cooked as above. In preparing the dried product the abalones are dressed, boiled, dried on trays, and then smoked, after which they are boiled and dried twice more; they are then ready for packing and shipment. Most of this product goes to China and Japan. The catch of live abalone from Point Lobos averages in gross weight 45,000 pounds a month or 540,000 pounds a year. The value to the fishermen is 1 cent a pound, exclusive of percentage, pearls, and shells.

SQUID, ALGÆ, AND SEA-URCHINS.

Fisheries for squid and algæ, formerly conducted by Chinese communities on the coast, are now worked on shares with Japanese, who

have gradually replaced the Chinese, outnumbering them 100 to 35 in 1904.

The squid catch is made during June, July, and August, with small purse seines, at night, the seine being placed on a large scow, which is preceded by a small boat carrying a torch and connected with the scow by a line. The torch is used to attract the squid to the surface that the seine may be thrown around them. Of late years squid have been of small size. Large squid as soon as captured are opened, scraped, and salted, very little salt being used, however; the small ones are cured whole. After being salted the squid are spread on flakes in fields, to remain until they have dried hard. The dried catch in 1904 amounted to 251,360 pounds, worth $10,054, a large amount of which was exported to China.

Algæ is torn from the rocks at low tide, dried and shipped to San Francisco. There were 40,410 pounds shipped in 1904, also 17,000 sea-urchins weighing 3,719 pounds. The latter were taken by Japanese, who dive for them without armor and pick them from the bottom.

CRABS.

Washington.—The crab catch has increased from 274,696 pounds, valued at $11,119, taken in 1899 to 723,080 pounds, valued at $22,692, taken in 1904. The latter catch was divided among the following counties: Whatcom, 212,000 pounds; Clallam, 250,080 pounds; Jefferson, 15,000 pounds; Snohomish, 126,000 pounds; Pacific, 120,000 pounds.

Most of the crabs are taken in pots with an iron frame 1½ feet high, 2½ feet wide, and 3½ feet long, which is covered with twine netting and has a funnel at each end. The bait is suspended in a small wire receptacle from the inside of the pot. The old style of drop or hoop net is also used to a limited extent. Of the crabs taken by the fishermen of Whatcom County 34,510 were taken in the waters of British Columbia and entered at the United States custom-house free of duty.

The demand for crabs is large and constantly increasing. The average gross weight of one is from 3 to 5 pounds and many are much heavier.

Oregon.—Crabs of large size are very plentiful near the mouth of the Alsea River a few miles from Yaquina. The quantity shipped in 1904 was 241,885 pounds.

California.—In this state also the output of crabs has greatly increased, and the demand is increasing. The yield in 1904 was 5,110,560 pounds, valued at $154,739, compared with 3,676,680 pounds valued at $85,784 in 1899, an increase of 1,433,880 pounds and $68,955. The increase may be largely accounted for by the more extensive use of gasoline boats. There were 33 of these boats in 1899 and 109 in 1904; 16 of them also fished with hooks and lines for bay

fish. Of the latter 10 belonged in Marin County. Four steamers of San Francisco, using paranzella nets, took $6,600 worth of crabs, which were disposed of in San Francisco.

The fishermen are nearly all Italians, and few of them speak English. A boat's crew consists of two men, and the boats leave San Francisco early every morning when the weather permits. September and October constitute the close season. During 1904 there were 45 days of unfavorable weather, leaving 259 fishing days. A boat's catch averages 5 dozen crabs per day, some days much more, others less. The selling price ranges from 75 cents to $1.50 per dozen, or an average of $1. The average weight of a crab is between 2 and 3 pounds.

The catch is made chiefly with hoop nets, of which each boat carries two dozen on an average. The nets are generally set and buoyed on the same ground every day during the season, the grounds extending from the entrance to the Golden Gate to Drakes Bay on the north, and about 10 miles south, or a total reach of 20 to 25 miles. The profits in the crab fishery are small, as the expense of running a boat is 75 cents per day for gasoline and 60 cents for bait, the latter consisting of herring and refuse fish.

SPINY LOBSTERS.

Of spiny lobsters the catch of 606,713 pounds in 1899 has increased to 1,078,065 pounds in 1904. The only place on the Pacific coast where spiny lobsters are found is in southern California, between Monterey and San Diego. The increase in the catch is chiefly due to the use of gasoline boats employed on new fishing grounds among the Santa Barbara Islands. The lobsters are shipped alive in sacks, their distribution having a range over all the Pacific coast and to interior cities.

SHRIMP.

Washington.—The shrimp fishery of this state has grown to considerable importance. The old fishing grounds off Pierce County are nearly exhausted, and few shrimp are now taken from them, but new grounds were found around San Juan, Orcas, Lopez, and Blakely islands. These were first fished in 1903 by vessels belonging to a Seattle firm, the season's catch amounting to 398,750 pounds, valued at $23,924. There were also taken 20,000 pounds from Pierce County, and 11,000 pounds from Skagit County, making a total for Washington of 429,750 pounds, valued at $26,104, compared with 19,600 pounds, valued at $1,960, taken in 1899. The entire catch is shipped alive to Seattle. The dealers prepare it for market by boiling it for three or four minutes, then assorting it. The shrimp fishery is prosecuted from small steamers, the apparatus being a dredge, or bag net 15 feet long, attached to an iron frame and towed by a rope 600 feet long. Shrimp in this region are usually found in water from 300 to 400 feet deep.

California.—For many years the shrimp catch of California has nearly all been taken by Chinese with nets set in San Francisco and San Pablo bays. The catch of 1899, including shells, was worth $110,886, while that of 1904 was worth only $71,830. The large decrease may be accounted for in part by the extension of the close season of 1904 from two to four of the best months for prosecuting this fishery, and later the passage by the legislature of a law prohibiting the sending of any shrimp out of the state, which stopped the export trade and greatly decreased the catch. A large portion of the catch had previously been shipped to China, and in 1899, 2,445,186 pounds of the shells were exported to that country for fertilizing purposes. The shells taken in 1904 amounted only to 950,000 pounds, and were sold chiefly to fruit growers of California.

GREEN TURTLES.

Once a month a steamer from Magdalena Bay, on the west coast of Lower California, brings alive to a fishery firm in San Francisco from 30 to 70 green turtles, which average 125 pounds each, some weighing as high as 200 pounds, gross weight. About two-thirds of them are cut up and retailed, the remainder, to save them, are boiled, a little rock salt being added in cooking, and then packed in two-pound cans. In 1904, 420 cases of 48 pounds each were packed and sold at $3.60 per case. The demand, however, for fresh or canned green turtle is light.

WHALES.

The whale fishery is gradually declining. In 1904 San Francisco had 9 steamers, 3 schooners, and 2 barks engaged, a total of 14 vessels of 3,925 tons register and valued at $202,000. The crews comprised 517 men; the outfit of the vessels and advances made to crews amounted to $242,626. There are one steamer and one sailing vessel less than in 1899, and the number of whales taken shows a large decrease since that year. The catches were 45 bowheads, 8 right, and 1 sperm, or a total of 54 whales, in 1904, compared with 101 bowheads, 7 right, and 6 sperm whales, or a total of 114, in 1899. The products and their value in 1904 aggregated 86,514 pounds of whalebone, worth $375,374; 1,220 pounds of trade bone, worth $4,745; $1,395 worth of ivory; $5,053 worth of furs; 41,869 gallons of whale oil, worth $17,161; 1,512 gallons of sperm oil, worth $756. The total value of products from 16 vessels in 1899 amounted to $458,692, compared with $404,484 from 14 vessels in 1904. During 1904 the largest catch by any vessel was 9 bowheads; 3 vessels made no catch.

WHOLESALE FISHERY TRADE.

The wages paid by Washington wholesale firms in 1904 aggregated $630,154. Of this amount the 27 salmon canneries paid $354,146; the

wholesale fish firms of Seattle and Tacoma, $214,487. Clam and sardine factories, cold-storage plants, boneless-fish establishments, and fertilizer works paid an aggregate of $65,521.

The following table shows the shipments of fresh fish by express and fast freight over the Northern Pacific Railway during 1903 and 1904 from stations between Portland, Oreg., and Seattle, Wash.:

	1903.	1904.
	Pounds.	*Pounds.*
Seattle	3,643,687	3,385,305
Tacoma	3,377,632	3,637,103
Aberdeen	363,493	557,510
Kalama	296,728	297,670
Kelso	220,643	170,276
Hoaquim	185,606	130,760
Snohomish	108,965	83,650
Olympia	62,630	65,095
South Bend	43,635	63,292
Cosmopolis	69,448	3,687
Fairhaven	2,296	....
Portland	82,516	126,457
Total	8,457,279	8,520,805

With the exception of Portland, all of the above-mentioned stations are in Washington. The shipments of 1904 show a net increase of 63,526 pounds over those of 1903. Seattle and Tacoma furnished nearly seven-eighths of the total shipments from this district, most of which went to cities on the eastern coast. Those from Tacoma were chiefly halibut and those from Seattle largely salmon. The Great Northern Express also shipped from Seattle during 1904, 1,713,230 pounds of fish, which went chiefly to cities east of the Rocky Mountains.

Seattle.—The wholesale fish trade of Seattle has experienced many changes during the past ten years. Men not familiar with the business have dropped out after heavy losses and from lack of capital. Men of many years' experience and large capital have succeeded them, and this has placed the business on a more certain foundation with fewer firms engaged. During 1904 Seattle was represented by 6 firms with $355,900 capital, employing 172 persons at wages amounting to $116,487. The sales in that year amounted to 11,354,225 pounds of fresh, salted, smoked, and kippered fish, crabs, shrimp, and spiny lobsters, 4,372 bushels of clams, 13,640 bushels of oysters, and 13,200 cases of canned salmon, the total value of the sales being $676,937. The following were the leading products and the quantity and value of each: Fresh salmon, 2,874,220 pounds, valued at $158,125; mild-cured salmon, 987,600 pounds, valued at $88,339; fresh halibut, 4,654,590 pounds, valued at $192,025; salted cod, 889,000 pounds, valued at $42,050; smoked halibut, 187,000 pounds, valued at $15,550; smoked salmon, 42,000 pounds, valued at $3,800; and crabs, 124,140 pounds, valued at $6,137.

THE WHOLESALE FISHERY TRADE OF SEATTLE IN 1904.

Item.	Number.	Value.
Establishments	6	$208,900
Cash capital	....	147,000
Wages paid	....	116,487
Persons engaged	172	....

Product.	Quantity.	Value.	Product.	Quantity.	Value.
Fresh:			Salted:		
Black cod .... pounds..	133,240	$8,049	Cod .... pounds..	889,000	$42,050
Brook trout .... do....	10,125	1,417	Herring (bbl.) ...... do....	172,000	4,170
Cultus cod .... do....	60,100	3,004	Halibut .... do....	127,000	5,890
Flounders .... do....	44,160	1,355	Salmon, chinook (bbl.), pounds	280,000	8,700
Halibut .... do....	4,654,590	192,025	Salmon, chinook, mild-cured .... pounds..	901,600	84,792
Herring .... do....	242,000	9,310	Salmon, silver ...... do....	86,000	3,547
Perch .... do....	73,400	2,544	Smoked:		
Rockfish .... do....	56,600	3,204	Halibut .... do....	187,000	15,550
Salmon—			Herring .... do....	16,350	603
Blueback, or sock-eye, pounds	153,500	9,245	Salmon—		
Chinook .... pounds..	735,840	52,426	Chinook .... do....	19,000	2,375
Dog, or chum ...... do....	742,560	28,560	Dog, or chum ...... do....	12,000	600
Silver .... do....	995,675	49,784	Silver .... do....	11,000	825
Steelhead .... do....	246,645	18,110	Kippered salmon, chinook, pounds	16,000	1,600
Smelts .... do....	223,500	9,825	Canned:		
Sturgeon .... do....	73,000	6,370	Salmon, dog .... cases..	7,200	18,720
Crabs (4,939 doz.) .... do....	124,140	6,137	Salmon, silver ...... do....	6,000	21,000
Spiny lobsters .... do....	38,400	5,184	Total	....	676,937
Shrimp .... do....	29,800	2,464			
Clams .... bushels..	4,372	4,392			
Oysters, eastern ...... do....	2,080	9,100			
Oysters, native ...... do....	11,560	44,010			

Tacoma.—The fish business of Tacoma has increased since 1899, from two firms with $55,000 capital, to four firms in 1904 with $268,550 capital and 122 persons employed, to whom were paid $98,000 in wages. The leading products handled in 1904 were 6,175,000 pounds of fresh and salted halibut, 3,970,200 pounds of fresh, salted, frozen, and mild-cured salmon; 1,207,000 pounds of other fish, and 246,160 pounds of oysters, clams, crabs, and shrimp, a total of 11,598,360 pounds, valued at $500,141, against a total in 1899 of 4,298,000 pounds. The halibut and salmon were shipped mostly to cities on the Atlantic coast. The Northern Pacific Railway carried to eastern points shipments of fresh and frozen, pickled, and mild-cured fish amounting to 6,212,000 pounds. A large amount of fresh halibut was sent to Portland, San Francisco, and other Pacific coast cities by local steamers.

WHOLESALE FISHERY TRADE OF TACOMA IN 1904.

Item.	Number.	Value.
Establishments	4	$108,550
Cash capital		160,000
Wages paid		98,000
Persons engaged	122	

Product.	Pounds.	Value.	Product.	Pounds.	Value.
Fresh:			Mild cured salmon: Chinook	563,000	$56,300
Black cod	40,000	$1,600			
Cultus cod	84,000	4,140	Salted:		
Flounders	14,000	300	Dog, or chum, salmon	666,000	11,940
Halibut	4,975,000	198,375	Silver salmon	60,000	2,400
Herring	75,000	1,500	Black cod	32,000	1,400
Perch	35,000	1,050	Cod	10,000	450
Rockfish	110,000	4,600	Boneless cod	9,000	680
Smelt	48,000	1,960	Herring	740,000	17,200
			Halibut	1,200,000	48,000
Total	5,381,000	213,525			
			Total	2,717,000	82,070
Salmon:					
Silver	570,000	25,300	Smoked: Herring (in boxes)	10,000	300
Chinook	526,200	29,748			
Steelhead	192,000	13,440	Miscellaneous:		
Dog, or chum	821,000	31,176	Crabs	142,200	8,860
Blueback, or sockeye	96,000	3,360	Clams (net weight)	53,228	4,625
Total	2,205,200	103,024	Oysters, eastern (net weight)	2,216	720
			Oysters, native (net weight)	23,116	6,675
Fresh frozen salmon:			Shrimp	25,400	2,432
Dog, or chum	360,000	15,300			
Chinook	11,000	860	Total	246,160	23,312
Silver	105,000	5,450			
			Grand total	11,598,360	500,141
Total	476,000	21,610			

Portland.—The wholesale fish trade of Oregon, which is centered at Portland, is of some importance, being represented by 6 firms with $132,050 capital and 52 employees, who were paid $31,900 in wages. The products handled by these firms amounted to 2,126,500 pounds of fresh fish, valued at $122,637; 88,000 pounds of smoked fish, valued at $7,695; 125,000 pounds of salt fish, valued at $5,605; making a total of 2,340,000 pounds of fish, valued at $135,937. There were also handled $59,993 worth of oysters, $12,065 worth of clams, $12,780 worth of crabs, and $3,985 worth of crawfish, shrimp, and lobsters. The aggregate value of products was $224,760. The bulk of the fish handled by the wholesale dealers consisted of 904,500 pounds of fresh salmon, 582,000 pounds of halibut, 227,900 pounds of crabs, and 139,600 pounds of shad.

Wholesale Trade of Portland, Oreg., in 1904.

Item.	Number.	Value.
Establishments	6	$89,550
Cash capital	....	42,500
Wages paid	....	31,900
Persons engaged	52	....

Product.	Quantity.	Value.	Product.	Quantity.	Value.
Fresh fish:			Smoked fish:		
Black bass ....pounds..	8,000	$582	Halibut ....pounds..	500	$40
Black cod ....do....	31,700	2,404	Herring ....do....	26,500	1,075
Catfish ....do....	67,400	4,748	Salmon ....do....	61,000	6,580
Flounders ....do....	43,000	2,[illegible]			
Halibut ....do....	582,000	31,990	Total	88,000	7,695
Herring ....do....	33,000	1,675			
Perch ....do....	35,700	1,860	Other products:		
Rockfish ....do....	7,300	531	Crabs ....pounds..	227,900	12,780
Salmon, chinook ....do....	819,500	52,877	Crawfish ....do....	7,000	800
Salmon, silver ....do....	54,000	2,700	Spiny lobsters ....do....	18,500	2,312
Salmon, steelhead ...do....	31,000	2,480	Lobsters, eastern ....do....	800	160
Shad ....do....	189,600	5,064	Shrimp ....do....	7,200	718
Smelt ....do....	194,400	6,276	Clams, hard ......bushels..	5,831	8,973
Striped bass.........do....	14,700	1,410	Clams, razor.........do....	1,659	3,092
Sturgeon ....do....	51,000	4,080	Oysters, eastern .....do....	358	1,248
Caviar, green ......do....	200	50	Oysters, native ......do....	13,279	35,700
Salmon eggs ....do....	12,000	1,410	Oysters, eastern, opened, quart cans	11,600	7,520
Tom cod ....do....	4,500	260			
Total	2,126,500	122,637	Oysters, native, opened, gallons	6,900	15,525
Salted fish:			Total	....	88,823
Cod ....pounds..	10,000	700			
Cod, boneless ....do....	7,500	670	Grand total	....	224,760
Herring ....do....	30,000	1,375			
Salmon ....do....	78,000	2,860			
Total	125,500	5,605			

San Francisco.—This city continues to be the headquarters of the fish business of California. Here a large fleet of steamers and sailing vessels annually fits out for the salmon fisheries of Alaska, and at the close of the season the vessels return bringing the products of their work, which are shipped to nearly all parts of the globe. The large fresh-fish markets of the city are usually supplied by small boats, as is the case at other ports, which make large shipments to this market. The fish business of San Francisco is represented by 26 firms, with $1,190,762 capital and 486 persons engaged, the wages paid in 1904 amounting to $306,642. The fresh fish used locally and shipped to the interior amounted in 1904 to 18,136,290 pounds, with a value of $554,476. There were also handled 7,746,761 pounds of miscellaneous products, such as oysters, clams, crabs, terrapin, turtles, spiny lobsters, eastern lobsters, crawfish, mussels, frogs, etc., having a value of $869,336.

THE WHOLESALE FISHERY TRADE OF SAN FRANCISCO IN 1904.

Item.	Number.	Value.
Establishments	26	$738,762
Cash capital		[illegible]
Persons engaged	[illegible]	
Wages paid		[illegible]

Product.	Pounds.	Value.	Product.	Pounds.	Value.
Fresh fish:			Salted fish—Continued.		
Albacore, or tunny	1,043	836	Mackerel	200,000	15,000
Barracuda	196,050	5,062	Salmon	3,190,000	143,300
Black bass	2,815	339	Sardines	56,000	5,400
Bonito	22,989	424	Squid	17,179	381
Carp	70,000	1,190			
Catfish	202,851	7,307	Total	12,320,679	616,418
Chub mackerel	81,570	2,051			
Cultus cod	160,080	5,272	Smoked fish:		
Flounders	1,819,802	51,235	Finnan haddie	24,000	2,640
Herring	1,344,000	14,400	Herring	141,000	6,640
Jewfish	1,854	22	Salmon	235,000	27,750
Kingfish	136,075	2,978	Sea bass	30,000	2,400
Perch	113,797	2,886			
Pompano	15,487	2,243	Total	430,000	39,430
Rockfish	882,445	36,747			
Sacramento pike	8,556	158	Other products:		
Salmon	5,431,305	196,285	Lobsters, eastern	2,950	229
Sardines	68,584	1,119	Lobsters, spiny	642,353	27,578
Sea bass	800,000	32,000	Crawfish	4,748	298
Shad	352,027	7,472	Crabs	4,495,000	141,085
Skates	190,000	1,435	Shrimp, in the shell	435,240	26,114
Smelt	670,009	30,258	Shrimp (meat)	51,935	18,177
Sole	3,818,536	66,716	Shrimp shells	120,000	240
Striped bass	1,397,979	71,982	Oysters, eastern (138,667 bu.)	970,669	514,399
Sturgeon	9,009	449	Oysters, native (42,931 bu.)	300,524	91,770
Caviar	1,309	258	Clams, hard (5,611 bu.)	44,890	5,867
Tom cod	65,000	2,500	Clams, soft (12,093 bu.)	120,930	15,747
Trout (lake)	12,706	2,523	Mussels (757 bu.)	7,566	366
Whitefish	210,943	1,700	Frogs	261	292
Yellow-tail	2,150	54	Terrapin	15,770	1,577
Other fish	47,316	1,372	Turtles, green	113,765	3,625
			Turtles, green, canned (420 cases)	20,160	1,512
Total	18,136,290	554,476	Fish glue	240,000	19,200
			Fish fertilizer	160,000	1,760
Salted fish:					
Anchovies	90,000	6,940			
Cod	4,348,000	181,090	Total	7,746,761	869,336
Cod, boneless	4,409,500	263,847			
Herring	10,000	400	Grand total	38,633,730	2,079,660

Sacramento.—This city has quite a local and interior trade, which amounted in 1904 to 2,532,120 pounds of fishery products, valued at $229,610. The five firms engaged represented a capital of $135,600. One American firm has a very attractive market, fitted with cold storage and all modern appliances. There is a Chinese store that carries on a considerable jobbing trade with interior towns.

THE WHOLESALE FISHERY TRADE OF SACRAMENTO FOR THE YEAR 1904.

Item.	Number.	Value.
Establishments	5	$61,300
Cash capital		74,300
Persons engaged	37	
Wages paid		[illegible]

THE WHOLESALE FISHERY TRADE OF SACRAMENTO FOR THE YEAR 1904—Continued.

Products.	Pounds.	Value.	Products.	Pounds.	Value.
Fresh fish:			Fresh fish—Continued.		
Barracuda	7,812	$547	Sole	24,985	$1,500
Black bass	3,500	420	Striped bass	40,242	3,602
Carp	24,000	430	Tomcod	1,970	158
Catfish	432,415	19,617			
Chub mackerel	6,432	450	Total	2,241,919	178,120
Flounders	91,060	4,201			
Hardheads	26,822	1,524	Other products:		
Herring	17,940	897	Spiny lobsters	14,790	1,887
Kingfish	2,930	205	Crabs	132,000	13,200
Perch	423	42	Shrimp	34,955	3,227
Rock-cod	13,750	1,100	Oysters, eastern (11,110 bu.)	77,776	27,441
Sacramento perch	8,420	935	Oysters, native (1,428 bu.)	10,000	3,600
Sacramento pike	2,809	137	Clams (2,585 bu.)	20,680	2,135
Salmon	1,517,692	140,890			
Sardines	5,680	284	Total	290,201	51,490
Skates	3,375	264			
Smelt	9,662	917	Grand total	2,532,120	229,610

Los Angeles.—Although Los Angeles is about 25 miles inland from the ocean, it handles the larger part of the fishery products taken by men of the several seaports of the county. The wholesale business has grown yearly and in 1904 there were nine firms with a total investment of $339,700; 178 persons were engaged, and received $75,623 in wages. The products handled amounted to 1,851,160 pounds of fresh fish, 220,800 pounds of spiny lobsters, 71,432 pounds of crabs, 254,400 pounds (31,800 bushels) of clams, 59,709 pounds of abalone and abalone shells, making a grand total of 2,457,501 pounds of fresh fishery products, valued at $134,526. In addition to the above $99,238 worth of sardines, mackerel, lobsters, albacore and abalone were canned, the total value of products handled in 1904 being $233,764.

These products were shipped to various parts of the country, including interior towns of California, New Mexico, Arizona, and Nevada.

SHIPMENTS OF FISH FROM THE SEVERAL PORTS IN LOS ANGELES COUNTY IN 1904.

From—	Fresh fish.	Other fish.	Total.
By Wells-Fargo Express:	*Pounds.*	*Pounds.*	*Pounds.*
San Pedro	2,140,685	179,524	2,320,209
Redondo	812,442	20,038	832,480
Long Beach	104,115		104,115
Santa Monica	312,602		312,602
Wilmington		242,983	242,983
Ocean Park	29,620		29,620
Total	3,399,464	442,545	3,842,009
By Salt Lake Railroad	228,000		228,000
Total	3,627,464	442,545	4,070,009

THE WHOLESALE FISHERY TRADE OF LOS ANGELES IN 1904.

Item.	Number.	Value.
Establishments	9	$221,250
Cash capital		118,450
Persons engaged	178	
Wages paid		75,623

Product.	Quantity.	Value.	Product.	Quantity.	Value.
Fresh:			Fresh—Continued:		
Albacore .... pounds..	10,000	$500	Other fish .... pounds..	21,320	$975
Barracuda .... do....	488,000	22,200	Spiny lobsters .... do....	220,800	15,624
Bonito .... do....	28,000	840	Crabs .... do....	71,432	8,274
Catfish .... do....	31,680	3,492	Clams (31,800 bushels), pounds	254,400	7,580
Flounders .... do....	554,600	25,565	Abalone, dried ... pounds..	5,000	350
Herring .... do....	2,600	104	Abalone shells .... do....	54,709	1,094
Jewfish .... do....	9,000	305			
Kingfish .... do....	5,000	200	Total	2,457,501	134,526
Pompano .... do....	4,540	686			
Rockfish .... do....	170,800	7,788	Canned:		
Salmon .... do....	114,480	13,289	Abalone .... cases..	1,214	4,966
Sardines .... do....	25,000	650	Abalone juice .... do....	206	702
Sea bass .... do....	32,500	1,525	Albacore .... do....	105	1,125
Shad .... do....	22,500	2,250	Spiny lobsters .... do....	2,045	16,134
Smelt .... do....	140,600	7,336	Mackerel .... do....	5,684	32,683
Sole .... do....	12,500	780	Sardines .... do....	4,292	43,628
Spanish mackerel .... do....	49,800	2,070			
Striped bass .... do....	68,240	8,504	Total	13,546	99,238
Tomcod .... do....	1,500	180			
Whitefish .... do....	4,000	160	Grand total	2,471,047	233,764
Yellow-fin .... do....	6,000	240			
Yellow-tail .... do....	48,500	1,965			

San Diego.—The fresh-fish business of San Diego is handled by four firms, with $17,280 capital. Wells-Fargo Express transported 1,064,242 pounds of fresh fish and 67,816 pounds of spiny lobsters—371,552 pounds of fishery products more than were handled in 1899. The Pacific Steamship Company took to San Francisco 335,440 pounds of dried fish and 111,335 pounds of pickled fish.

THE WHOLESALE FISHERY TRADE OF SAN DIEGO IN 1904.

Item.	Number.	Value.
Establishments	4	$11,280
Cash capital		6,000
Persons engaged	13	
Wages paid		8,000

Product.	Pounds.	Value.	Product.	Pounds.	Value.
Fresh fish:			Salted fish:		
Albacore	41,431	$1,445	Albacore	6,477	$227
Barracuda	414,318	14,501	Jewfish	3,385	135
Croakers	69,060	4,143	Rockfish	6,771	271
Flounders	348,725	15,727	Spanish mackerel	31,746	1,269
Herring	6,960	244	Yellow-tail	29,048	1,162
Jewfish	27,621	967			
Kingfish	3,382	135	Total	77,427	3,064
Mullet	3,452	242			
Perch	3,452	136	Other products:		
Rockfish	221,029	9,946	Spiny lobsters	69,066	5,345
Sea bass	41,431	1,445	Turtles	3,452	172
Sheepshead	13,610	476			
Smelt	7,905	295	Total	72,518	5,517
Sole	10,357	518			
Spanish mackerel	82,863	3,315	Grand total	1,558,296	123,408
Trout	13,810	829			
Whitefish	27,621	967			
Yellow-tail	71,324	2,496			
Total	1,408,351	114,827			

FISHERIES OF WASHINGTON.

NOTES AND GENERAL STATISTICS.

The fisheries of Washington continue to lead those of the other Pacific coast states in capital and products, though the catch of salmon in this state has decreased very noticeably during recent years. This, in a measure, has been offset by a very large increase in the halibut fisheries.

In 1904 the fisheries of Washington supported 50 fishing vessels, with a tonnage of 1,541 and value of $134,600; 80 transporting vessels, with a tonnage of 1,247 and value of $261,300; 63 gasoline boats, valued at $44,300, and 3,448 sail and row boats valued at $309,610. The principal apparatus were 257 seines, 1,538 gill nets, and 602 pound nets. The total value of vessels, boats, fishing apparatus, shore property, and cash capital was $5,319,201, against $6,601,243 in 1899, the year shown in the last previous canvass of the Pacific States. The number of persons engaged in 1904 was 8,829, a decrease of 1,082 since 1899. The products amounted to 88,954,790 pounds, with a value of $2,972,633 to the fishermen, a decrease of 31,632,936 pounds, caused chiefly by the closing of a number of canneries as the result of a correspondingly reduced demand.

NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF WASHINGTON IN 1904.

How employed.	Number.
On vessels, fishing	367
On vessels, transporting	240
In shore fisheries	5,467
On shore, in canneries, etc	2,755
Total	8,829

INVESTMENT IN THE FISHERIES OF WASHINGTON IN 1904.

Item.	Number.	Value.	Item.	Number.	Value.
Vessels, fishing	50	$134,600	Apparatus—Continued.		
Tonnage	1,541		Shore fisheries—Continued.		
Outfit		66,418	Pound nets	602	$1,276,230
Vessels, transporting	80	261,300	Fyke nets	6	90
Tonnage	1,247		Hoop nets	125	125
Outfit		42,335	Reef nets	5	2,500
Boats, sail and row	3,448	309,610	Dip nets	20	38
Boats, gasoline	63	44,300	Pots	2,744	3,464
Apparatus:			Wheels	19	52,000
Vessel fisheries—			Lines		895
Gill nets (300 yards)	1	75	Dredges, tongs, forks, etc.		6,525
Beam trawls	9	571	Shore and accessory property		1,570,740
Lines		20,015	Cash capital		1,200,000
Shore fisheries—					
Seines (87,304 yards)	257	143,885	Total		5,319,201
Gill nets (392,641 yards)	1,537	183,485			

PRODUCTS OF THE FISHERIES OF WASHINGTON IN 1904.

Species.	Pounds.	Value.	Species.	Pounds.	Value.
Black bass	78,000	$1,310	Shad	125,287	$1,753
Black cod	334,300	7,680	Smelts	1,370,322	26,903
Catfish	6,000	300	Sole	9,000	180
Cod, salted	2,072,000	62,450	Sturgeon	129,127	4,050
Cultus cod	144,000	2,214	Shrimp	429,750	26,104
Flounders	199,291	1,999	Crabs	723,080	22,692
Halibut	12,066,000	357,180	Oysters, eastern	[a] 269,000	122,700
Herring	531,750	3,155	Oysters, native	[b] 1,069,461	279,312
Perch	149,000	2,880	Clams, hard	[c] 774,568	54,512
Rock-fish	82,700	3,498	Clams, soft	[d] 132,500	8,650
Salmon:			Whales (3)		600
Blueback, or sockeye	11,507,410	527,388	Whalebone	8,000	40,000
Chinook	15,211,783	701,555			
Dog, or chum	13,652,168	131,440	Total	88,954,790	2,972,633
Silver	26,021,187	503,021			
Steelhead	1,859,106	79,107			

[a] 38,428 bushels. [b] 152,780 bushels. [c] 96,821 bushels. [d] 13,250 bushels.

THE FISHERIES BY COUNTIES.

The commercial fisheries of Washington in 1904 were prosecuted in 18 counties. These counties border the Pacific and its tributary bays along the coast and the Washington side of the Columbia River, the greater part of the fishing on the river being near the coast. The following tables show the number of persons employed and the capital invested in the fisheries in each county in 1904, and also the quantity and value of products taken, with the various forms of apparatus used, in the vessel and shore fisheries:

STATEMENT, BY COUNTIES, OF THE NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF WASHINGTON IN 1904.

Counties.	On vessels, fishing.	On vessels, transporting.	In shore fisheries.	On shore, in canneries, etc.	Total.
Chehalis		10	189	153	352
Clallam			333	140	473
Cowlitz		2	92	10	104
Island			328	16	344
Jefferson	5	12	92	44	153
King	255	16	864	234	1,369
Kitsap			97		97
Klickitat			2		2
Mason			228	5	233
Pacific		41	936	292	1,269
Pierce	58	8	249	108	423
San Juan			116		116
Skagit	47	56	240	435	778
Skamania			47		47
Snohomish	2	2	103		107
Thurston		15	104	32	151
Wahkiakum		20	1,013	519	1,552
Whatcom		58	434	767	1,259
Total	367	240	5,467	2,755	8,829

STATEMENT BY COUNTIES OF THE VESSELS, BOATS, APPARATUS, AND CAPITAL EMPLOYED IN THE FISHERIES OF WASHINGTON IN 1904.

Counties.	Vessels fishing.				Vessels transporting.			
	No.	Tonnage.	Value.	Value of outfit.	No.	Tonnage.	Value.	Value of outfit.
Chehalis					4	40	$10,800	$1,150
Cowlitz					1	5	1,000	350
Jefferson	1	13	$600	$660	2	55	18,000	1,600
King	39	1,010	68,200	39,949	6	42	16,000	5,450
Pacific					21	141	28,800	3,750
Pierce	6	139	46,500	21,510	2	63	10,000	1,030
Skagit	3	369	19,000	4,299	14	468	61,000	12,115
Snohomish	1	10	300		1	6	1,200	400
Thurston					7	39	13,800	2,700
Wahkiakum					8	129	18,700	3,900
Whatcom					14	259	82,000	9,890
Total	50	1,541	134,600	66,418	80	1,247	261,300	42,335

Counties.	Boats, sail and row.		Boats, gasoline.		Apparatus in vessel fisheries.					
					Gill nets.			Beam trawls.		Value of lines.
	No.	Value.	No.	Value.	No.	Length.	Value.	No.	Value.	
						Yards.				
Chehalis	69	$8,265								
Clallam	234	8,830								
Cowlitz	47	1,265								
Island	190	38,625	3	$3,500						
Jefferson	51	3,605	1	1,000						$375
King	182	17,870	21	11,000				6	$372	13,380
Kitsap	55	4,600								
Mason	314	14,790	1	1,000						
Pacific	709	41,190								
Pierce	126	3,880	7	7,000				2	137	3,050
San Juan	83	18,285								
Skagit	218	19,260	1	600				1	62	3,200
Skamania	21	1,850								
Snohomish	84	2,850	2	800	1	300	$75			10
Thurston	239	7,950								
Wahkiakum	431	56,900	27	19,400						
Whatcom	395	56,595								
Total	3,448	309,610	63	44,300	1	300	75	9	571	20,015

Counties.	Apparatus in shore fisheries.							
	Seines.			Gill nets.			Pound nets.	
	No.	Length.	Value.	No.	Length.	Value.	No.	Value.
		Yards.			Yards.			
Chehalis				177	34,150	$12,510	1	$400
Clallam	7	700	$460	70	1,400	700		
Cowlitz	2	600	1,000	10	1,500	1,500	4	2,400
Island	13	6,280	4,325				27	123,480
Jefferson	8	1,560	1,250	7	1,400	525	4	9,300
King	95	38,800	73,700	82	31,800	18,300	4	12,000
Kitsap	3	1,200	900	7	1,400	525	5	15,000
Mason	11	3,233	3,300	13	2,600	975	2	1,500
Pacific	18	7,932	24,400	57	34,600	7,750	350	264,950
Pierce	47	11,100	15,850	50	5,000	1,500		
San Juan							12	52,800
Skagit				280	35,500	12,000	42	196,000
Skamania	4	1,280	1,200					
Snohomish	9	1,170	900	145	10,091	4,150		
Thurston	14	1,666	2,300					
Wahkiakum	24	10,943	13,300	519	226,200	119,750	39	30,400
Whatcom	2	840	1,000	120	7,000	3,300	112	568,000
Total	257	87,304	143,885	1,537	392,641	183,485	602	1,276,230

STATEMENT BY COUNTIES OF THE VESSELS, BOATS, APPARATUS, AND CAPITAL EMPLOYED IN THE FISHERIES OF WASHINGTON IN 1904—Continued.

Counties.	Apparatus in shore fisheries—Continued.											
	Fyke nets.		Hoop nets.		Reef nets.		Dip nets.		Pots.		Wheels.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Clallam									720	$1,440		
Cowlitz	6	$90					20	$38				
Jefferson									24	24		
Klickitat											4	7,000
Pacific			125	$125								
San Juan					5	$2,500						
Skamania											15	45,000
Snohomish									800	800		
Whatcom									1,200	1,200		
Total	6	90	125	125	5	2,500	20	38	2,744	3,464	19	52,000

Counties.	Apparatus in shore fisheries—Continued.		Value of shore and accessory property.	Cash capital.	Total investment.
	Value of lines.	Value of dredges, tongs, forks, etc.			
Chehalis		$153	$42,200	$42,000	$117,478
Clallam	$725	60	22,450	13,000	47,665
Cowlitz			11,000	14,000	32,643
Island		75	21,850	2,000	193,855
Jefferson	20	24	12,725	4,000	53,708
King		2	246,850	167,000	690,073
Kitsap		60	4,800		25,885
Klickitat			300		7,300
Mason		2,213	2,650	1,000	27,428
Pacific		3,171	129,900	72,000	579,036
Pierce	150	10	111,050	160,000	381,667
San Juan			4,500		78,085
Skagit			255,661	204,000	787,197
Skamania			1,000		49,050
Snohomish			890		12,375
Thurston		757	16,775	16,000	60,282
Wahkiakum			275,889	245,000	783,239
Whatcom			410,250	260,000	1,392,235
Total	895	6,525	1,570,740	1,200,000	5,319,201

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF WASHINGTON IN 1904.

Species.	Chehalis.		Clallam.		Cowlitz.		Island.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass			53,000	$1,060				
Black cod			7,000	165				
Catfish					6,000	$300		
Cultus cod			10,000	183				
Halibut			440,000	10,700				
Rockfish			15,000	300				
Salmon:								
Blueback, or sockeye	150,000	$4,950			7,200	288	97,112	$4,113
Chinook	514,208	12,855	125,150	4,280	197,000	10,570	845,683	34,463
Dog, or chum	632,120	8,532	45,060	840			656,717	6,763
Silver	1,434,464	25,470	980,297	22,354	652,086	14,804	3,331,577	67,547
Steelhead	105,000	4,000	52,000	1,560	24,000	960		
Shad					100,000	1,500		
Smelts					420,276	4,202	510,000	10,200
Sturgeon					108,000	3,240		
Crabs			250,080	6,552				
Clams, hard			19,768	1,020			48,000	2,400
Clams, soft	132,500	8,650						
Whales				600				
Total	2,968,292	64,457	1,997,355	49,614	1,514,562	35,864	5,489,089	125,486

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF WASHINGTON IN 1904—Continued.

Species.	Jefferson.		King.		Kitsap.		Klickitat.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black cod			310,300	$6,865				
Cod, salted			1,072,000	37,450				
Cultus cod	2,000	$50	131,000	1,966				
Halibut	2,000	60	7,624,000	226,420				
Herring	251,000	1,540						
Perch	2,000	40						
Rockfish	500	10						
Salmon:								
Blueback, or sockeye			1,247,172	54,047	45,114	$1,805	7,000	$420
Chinook	177,256	2,586	160,000	6,100	50,000	1,000	20,000	1,200
Dog, or chum	480,500	4,280	4,237,623	55,635	382,814	2,164		
Silver	748,560	17,066	6,346,000	102,218	100,000	1,500		
Steelhead	25,000	500	180,445	8,085	25,000	500	3,000	120
Smelts	2,000	40						
Shrimp			398,750	23,924				
Crabs	15,000	500						
Clams, hard	65,400	4,100	11,140	780	450,000	31,050		
Whalebone			8,000	40,000				
Total	1,771,216	30,772	21,726,430	563,490	1,052,928	38,019	30,000	1,740

Species.	Mason.		Pacific.		Pierce.		San Juan.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass					25,000	$250		
Black cod					17,000	650		
Cultus cod					1,000	15		
Flounders					138,000	1,380		
Halibut					4,000,000	120,000		
Herring					80,000	600		
Perch					80,000	1,500		
Rockfish					50,000	2,500		
Salmon:								
Blueback, or sockeye			1,422,181	$71,768	331,657	16,322	1,410,505	$62,133
Chinook	50,500	$1,010	3,562,452	184,727	215,000	10,750	904,962	26,087
Dog, or chum	1,260,654	10,197	1,595,364	8,576	896,407	8,182	67,880	534
Silver	622,720	11,954	886,572	13,322	1,060,500	20,925	796,979	15,145
Steelhead	25,000	500	822,137	36,460				
Shad			5,287	53				
Smelts			5,046	51	283,000	7,910		
Sturgeon			20,809	788				
Shrimp					20,000	1,520		
Crabs			120,000	6,000				
Oysters, eastern			269,000	122,700				
Oysters, native	197,000	45,560	420,000	123,750				
Clams, hard	12,850	900			57,600	4,320		
Total	2,168,724	70,121	9,128,848	568,195	7,255,164	196,824	3,180,326	103,899

Species.	Skagit.		Skamania.		Snohomish.		Thurston.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Cod, salted	1,000,000	$25,000						
Flounders	291	9			36,000	$360	25,000	$250
Herring	750	15			200,000	1,000		
Perch					27,000	540	40,000	800
Rockfish					17,200	688		
Salmon:								
Blueback, or sockeye	191,230	7,649	213,178	$7,272				
Chinook	1,452,215	62,150	274,241	13,713	202,500	6,445		
Dog, or chum	1,812,889	15,533			159,190	1,269	324,000	3,240
Silver	2,689,641	60,604	29,304	880	792,175	14,586	78,000	1,560
Steelhead	40,000	2,900	152,364	5,235	117,500	5,838		
Smelts							150,000	4,500
Sole					9,000	180		
Sturgeon	318	22						
Shrimp	11,000	660						
Crabs					126,000	5,400		
Oysters, native							452,461	110,002
Clams, hard							109,810	9,942
Total	7,198,334	174,542	669,087	27,100	1,686,565	36,306	1,179,271	130,294

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF WASHINGTON IN 1904—Continued.

Species.	Wahkiakum.		Whatcom.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass					78,000	$1,310
Black cod					334,300	7,680
Cat-fish					6,000	300
Cod, salted					2,072,000	62,450
Cultus cod					144,000	2,214
Flounders					199,291	1,999
Halibut					12,066,000	357,180
Herring					531,750	3,155
Perch					149,000	2,880
Rockfish					82,700	3,498
Salmon:						
Blueback, or sockeye	97,758	$3,383	6,287,303	$293,238	11,507,410	527,388
Chinook	5,638,063	297,463	822,553	26,156	15,211,783	701,555
Dog, or chum	950,950	4,195	150,000	1,500	13,652,168	131,440
Silver	2,375,244	58,821	3,097,068	54,265	26,021,187	503,021
Steelhead	287,660	12,449			1,859,106	79,107
Shad	20,000	200			125,287	1,753
Smelts					1,370,322	26,903
Sole					9,000	180
Sturgeon					129,127	4,050
Shrimp					429,750	26,104
Crabs			212,000	4,240	723,080	22,692
Oysters, eastern					269,000	122,700
Oysters, native					1,069,461	279,312
Clams, hard					774,568	54,512
Clams, soft					132,500	8,650
Whales						600
Whalebone					8,000	40,000
Total	9,369,675	376,511	10,568,924	379,399	88,954,790	2,972,633

STATEMENT, BY COUNTIES AND APPARATUS, OF THE YIELD OF THE VESSEL FISHERIES OF WASHINGTON IN 1904.

Apparatus and species.	King.		Pierce.	
	Pounds.	Value.	Pounds.	Value.
Lines:				
Black cod	310,300	$6,865	2,000	$50
Cod, salted	1,072,000	37,450		
Cultus cod	131,000	1,966	1,000	15
Halibut	7,624,000	226,420	4,000,000	120,000
Total	9,137,300	272,701	4,003,000	120,065
Beam trawls: Shrimp	398,750	23,924	20,000	1,520
Miscellaneous apparatus: Whalebone	8,000	40,000		
Grand total	9,544,050	336,625	4,023,000	121,585

Apparatus and species.	Skagit.		Snohomish.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Gill nets: Salmon, silver			20,000	$400	20,000	$400
Lines:						
Black cod					312,300	6,915
Cod, salted	1,000,000	$25,000			2,072,000	62,450
Cultus cod					132,000	1,981
Halibut					11,624,000	346,420
Rock fish			1,000	40	1,000	40
Total	1,000,000	25,000	1,000	40	14,141,300	417,806
Beam trawls: Shrimp	11,000	660			429,750	26,104
Miscellaneous apparatus: Whalebone					8,000	40,000
Grand total	1,011,000	25,660	21,000	440	14,599,050	484,310

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF WASHINGTON IN 1904.

Apparatus and species.	Chehalis.		Clallam.		Cowlitz.		Island.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Salmon:								
Chinook			20,000	$800				
Dog, or chum			18,690	411			300,000	$3,750
Silver			74,700	1,807			169,803	3,354
Steelhead			15,000	450				
Shad					55,000	$825		
Smelts							322,000	6,440
Sturgeon					10,000	300		
Total			128,390	3,468	65,000	1,125	791,803	13,544
GILL NETS.								
Salmon:								
Blueback, or sock-eye	150,000	$4,950			7,200	288		
Chinook	475,336	11,883	60,000	2,300	72,000	4,320		
Dog, or chum	590,620	7,717	20,000	400				
Silver	1,287,435	21,521	47,500	1,350				
Steelhead	105,000	4,000	37,000	1,110	24,000	960		
Shad					45,000	675		
Sturgeon					98,000	2,940		
Total	2,608,391	50,071	164,500	5,160	216,200	9,183		
POUND NETS.								
Salmon:								
Blueback, or sock-eye							97,112	4,113
Chinook	38,872	972			125,000	6,250	845,683	34,463
Dog, or chum	41,500	815					356,717	3,013
Silver	147,029	3,949			652,086	14,804	3,161,774	64,193
Smelts							188,000	3,760
Total	227,401	5,736			777,086	21,054	4,649,286	109,542
FYKE NETS.								
Catfish					6,000	300		
DIP NETS.								
Smelts					420,276	4,202		
POTS.								
Crabs			229,080	5,852				
LINES.								
Black bass			53,000	1,060				
Black cod			7,000	165				
Cultus cod			10,000	183				
Halibut			440,000	10,700				
Rockfish			15,000	300				
Salmon:								
Chinook			45,150	1,180				
Dog, or chum			6,370	29				
Silver			858,097	19,197				
Total			1,434,617	32,814				
DREDGES, TONGS, FORKS, ETC.								
Clams, hard			19,768	1,020			48,000	2,400
Clams, soft	132,500	8,650						
Crabs			21,000	700				
Total	132,500	8,650	40,768	1,720			48,000	2,400
HARPOONS.								
Whales (3)				600				
Grand total	2,968,292	64,457	1,997,355	49,614	1,514,562	35,864	5,489,089	125,486

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF WASHINGTON IN 1904—Continued.

Apparatus and species.	Jefferson.		King.		Kitsap.		Klickitat.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Herring	51,000	$540						
Salmon:								
Blueback, or sock-eye			1,069,172	$45,947	45,114	$1,805		
Chinook	27,000	560	60,000	2,100	25,000	500		
Dog, or chum	235,500	1,830	3,837,623	49,635	357,814	1,914		
Silver	92,000	1,465	4,292,000	66,712	50,000	750		
Steelhead	12,000	240			12,000	240		
Smelts	2,000	40						
Total	419,500	4,675	9,258,795	164,394	489,928	5,209		
GILL NETS.								
Salmon:								
Blueback, or sock-eye			178,000	8,100				
Chinook	25,000	500	100,000	4,000	25,000	500		
Dog, or chum	25,000	250	400,000	6,000	25,000	250		
Silver	50,000	750	2,054,000	35,506	50,000	750		
Steelhead	13,000	260	105,529	5,089	13,000	260		
Total	113,000	1,760	2,837,529	58,695	113,000	1,760		
POUND NETS.								
Herring	200,000	1,000						
Salmon:								
Chinook	125,256	1,526						
Dog, or chum	220,000	2,200						
Silver	606,560	14,851						
Steelhead			74,916	2,996				
Total	1,151,816	19,577	74,916	2,996				
POTS.								
Crabs	15,000	500						
WHEELS.								
Salmon:								
Blueback, or sock-eye							7,000	$420
Chinook							20,000	1,200
Steelhead							3,000	120
Total							30,000	1,740
LINES.								
Cultus cod	2,000	50						
Halibut	2,000	60						
Perch	2,000	40						
Rockfish	500	10						
Total	6,500	160						
DREDGES, TONGS, FORKS, ETC.								
Clams, hard	65,400	4,100	11,140	780	450,000	31,050		
Grand total	1,771,216	30,772	12,182,380	226,865	1,052,928	38,019	30,000	1,740

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF WASHINGTON IN 1904—Continued.

Apparatus and species.	Mason.		Pacific.		Pierce.		San Juan.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Flounders					113,000	$1,130		
Herring					80,000	600		
Perch					80,000	1,500		
Salmon:								
Blueback, or sock-eye			237	$9	331,657	16,322	82,000	$3,280
Chinook	37,000	$740	421,564	21,697	140,000	7,000		
Dog, or chum	702,500	6,375	1,189	595	821,407	7,432		
Silver	297,720	5,579			660,500	12,925	99,869	1,997
Steelhead	18,500	370	122,176	5,239				
Smelts					283,000	7,910		
Total	1,055,720	13,064	545,166	27,540	2,509,564	54,819	181,869	5,277
GILL NETS.								
Salmon:								
Chinook	13,500	270	1,274,874	66,046	75,000	3,750		
Dog, or chum	290,000	1,811	229,375	1,157	75,000	750		
Silver	25,000	375	118,920	2,151	400,000	8,000		
Steelhead	6,500	130	12,134	572				
Shad			5,287	53				
Smelts			5,046	51				
Sturgeon			2,951	74				
Total	335,000	2,586	1,648,587	70,104	550,000	12,500		
POUND NETS.								
Salmon:								
Blueback, or sock-eye			147,070	5,713			1,188,505	53,953
Chinook			3,140,888	163,030			882,962	25,592
Dog, or chum	268,154	2,011	1,364,800	6,824			17,880	134
Silver	300,000	6,000	767,652	11,171			417,372	7,553
Steelhead			687,827	30,619				
Sturgeon			17,858	714				
Total	568,154	8,011	6,126,095	218,101			2,506,719	87,232
HOOP NETS.								
Crabs			120,000	6,000				
REEF NETS.								
Salmon:								
Blueback, or sock-eye							140,000	4,900
Chinook							22,000	495
Dog, or chum							50,000	400
Silver							80,000	1,600
Total							292,000	7,395
LINES.								
Black bass					25,000	250		
Black-cod					15,000	600		
Flounders					25,000	250		
Rockfish					50,000	2,500		
Salmon:								
Silver							199,738	3,995
Total					115,000	3,600	199,738	3,995
DREDGES, TONGS, FORKS, ETC.								
Clams, hard	12,850	900			57,600	4,320		
Oysters, eastern			269,000	122,700				
Oysters, native	197,000	45,560	420,000	123,750				
Total	209,850	46,460	689,000	246,450	57,600	4,320		
Grand total	2,168,724	70,121	9,128,848	568,195	3,232,164	75,239	3,180,326	103,899

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF WASHINGTON IN 1904—Continued.

Apparatus and species.	Skagit.		Skamania.		Snohomish.		Thurston.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Flounders					36,000	$360	25,000	$250
Herring					200,000	1,000		
Perch					27,000	510	40,000	800
Rockfish					16,200	648		
Salmon:								
Blueback, or sock-eye			29,193	$1,168				
Chinook	240,000	$9,600			10,000	670		
Dog, or chum	867,994	4,340			54,190	399	324,000	3,240
Silver					164,175	2,901	78,000	1,560
Steelhead			22,088	884				
Smelts							150,000	4,500
Sole					9,000	180		
Total	1,107,994	13,940	51,281	2,052	516,565	6,698	617,000	10,350
GILL NETS.								
Salmon:								
Chinook	1,058,100	46,024			192,500	5,775		
Dog, or chum	780,000	9,950			105,000	870		
Silver	2,227,500	51,000			608,000	11,285		
Steelhead	40,000	2,900			117,500	5,838		
Total	4,105,600	109,874			1,023,000	23,768		
POUND NETS.								
Flounders	291	9						
Herring	750	15						
Salmon:								
Blueback, or sock-eye	191,230	7,649						
Chinook	154,115	6,526						
Dog, or chum	164,895	1,243						
Silver	462,141	9,604						
Sturgeon	318	22						
Total	973,740	25,068						
POTS.								
Crabs					126,000	5,400		
WHEELS.								
Salmon:								
Blueback, or sock-eye			183,985	6,104				
Chinook			274,241	13,713				
Silver			29,304	880				
Steelhead			130,276	4,351				
Total			617,806	25,048				
DREDGES, TONGS, FORKS, ETC,								
Clams, hard							109,810	9,942
Oysters, native							452,461	110,002
Total							562,271	119,944
Grand total	6,187,334	148,882	669,087	27,100	1,665,565	35,866	1,179,271	130,294

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF WASHINGTON IN 1904—Continued.

Apparatus and species.	Wahkiakum.		Whatcom.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.						
Flounders					174,000	$1,740
Herring					331,000	2,140
Perch					147,000	2,840
Rockfish					16,200	648
Salmon:						
Blueback, or sock-eye	97,758	$3,383			1,655,131	71,914
Chinook	1,785,258	92,949			2,765,822	136,616
Dog, or chum			60,000	$600	7,580,907	80,521
Silver					5,978,767	99,050
Steelhead	112,660	4,609			314,424	12,032
Shad	20,000	200			75,000	1,025
Smelts					757,000	18,890
Sole					9,000	180
Sturgeon					10,000	300
Total	2,015,676	101,141	60,000	600	19,814,251	427,896
GILL NETS.						
Salmon:						
Blueback, or sock-eye			629,739	28,656	964,939	41,994
Chinook	3,835,171	203,632	4,162	96	7,210,643	349,096
Dog, or chum	280,000	1,400	20,000	200	2,839,995	30,755
Silver	998,115	24,703	1,336,588	21,622	9,203,058	179,013
Steelhead	145,000	6,640			618,663	27,759
Shad					50,287	728
Smelts					5,046	51
Sturgeon					100,951	3,014
Total	5,258,286	236,375	1,990,489	50,574	20,993,582	632,410
POUND NETS.						
Flounders					291	9
Herring					200,750	1,015
Salmon:						
Blueback, or sock-eye			5,657,564	264,582	7,281,481	336,010
Chinook	17,634	882	818,391	26,060	6,148,801	265,301
Dog, or chum	670,950	2,795	70,000	700	3,174,896	19,735
Silver	1,377,129	34,118	1,760,480	32,643	9,652,223	198,886
Steelhead	30,000	1,200			792,743	34,845
Smelts					188,000	3,760
Sturgeon					18,176	736
Total	2,095,713	38,995	8,306,435	323,985	27,457,361	860,297
FYKE NETS.						
Catfish					6,000	300
HOOP NETS.						
Crabs					120,000	6,000
REEF NETS.						
Salmon:						
Blueback, or sock-eye					140,000	4,900
Chinook					22,000	495
Dog, or chum					50,000	400
Silver					80,000	1,600
Total					292,000	7,395
DIP NETS.						
Smelts					420,276	4,202
POTS.						
Crabs			212,000	4,240	582,080	15,992
WHEELS.						
Salmon:						
Blueback, or sock-eye					190,985	6,524
Chinook					294,241	14,913
Silver					29,304	880
Steelhead					133,276	4,471
Total					647,806	26,788

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF WASHINGTON IN 1904—Continued.

Apparatus and species.	Wahkiakum.		Whatcom.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
LINES.						
Black bass					78,000	$1,310
Black cod					22,000	765
Cultus cod					12,000	233
Flounders					25,000	250
Halibut					442,000	10,760
Perch					2,000	40
Rockfish					65,500	2,810
Salmon:						
Chinook					45,150	1,180
Dog, or chum					6,370	29
Silver					1,057,835	23,192
Total					1,755,855	40,569
DREDGES, TONGS, FORKS, ETC.						
Clams, hard					774,568	54,512
Clams, soft					132,500	8,650
Crabs					21,000	700
Oysters, eastern					269,000	122,700
Oysters, native					1,069,461	279,312
Total					2,266,529	465,874
HARPOONS.						
Whales (3)						600
Grand total	9,369,675	$376,511	10,568,924	$379,399	74,355,740	2,488,323

FISHERIES OF OREGON.

NOTES AND GENERAL STATISTICS.

Although near the Oregon shores there are banks well known to afford profitable fishing, and these, too, are convenient to railroads, the fisheries of this state continue to be confined to a few months' salmon fishing in the Columbia River and some in smaller streams. There appears, however, an increase since the last canvass, the total investment in 1904 being $3,756,692, against $3,497,643 in 1899. The products in 1904 amounted to 27,535,232 pounds, valued at $1,185,092, compared with 22,818,411 pounds, valued at $855,750, in 1899, a gain of 4,716,821 pounds and $329,342. There was a decrease in the number of persons employed, however, from 5,643 in 1899 to 5,299 in 1904.

Astoria, with fewer canneries than in past years, continues to be the leading center of the Columbia River fisheries. In addition to 174,008 cases of salmon packed by its six canneries, the following shipments (including that of a cold-storage firm at Goble and small shipments from Coos and Tillamook counties) were made by the canneries and two cold-storage firms: Mild-cured chinook, 5,103,193 pounds, valued at $649,101; silver salmon, 116,000 pounds, valued at $9,280; fresh frozen steelhead, 1,496,281 pounds, valued at $113,755; fresh frozen silver salmon, 1,386,875 pounds, valued at $67,260; chinook, 12,025 pounds, valued at $601; chum or dog salmon, 7,500 pounds, valued at $75; sturgeon, 19,494 pounds, valued at $2,729; shad, 21,150 pounds, valued at $846; smelt, 20,184 pounds, valued at $807. The total salmon packed and shipped as mild cured and fresh frozen was 8,121,874 pounds. With the exception of 46,000 pounds the 5,103,193 pounds of chinook were all taken from the Columbia River by Oregon fishermen. The small experimental shipments of fresh shad and smelts to New York proved successful. Nearly all mild cured and fresh frozen fish were shipped to eastern cities in refrigerator cars.

The principal apparatus used by the Oregon fishermen is gill nets, the catch with these being 22,800,274 pounds out of the total 27,535,232 pounds by all apparatus. The gill nets are of several sizes, with from 7 to 9½ inch mesh. Of the 2,631 nets owned by the fishermen only about one-third were in use at the same time. Haul seines are used chiefly from the sand bars of the lower Columbia River, horses being used in hauling them. Fifty seines were used in taking 2,579,182 pounds of salmon and 10,983 pounds of shad in 1904. Fish wheels

have had light catches during the past few years, the aggregate catch of the 30 used during 1904 being 1,416,993 pounds of salmon. Gasoline boats and steam tugs are quite extensively used by canners, fish buyers, and others in transporting fish and towing boats to or from the fishing grounds. Eighty-four were used in 1904. The fishermen, with very few exceptions, continue to use sails and oars. Gasoline boats, now so universally used by the fishermen of California, are seldom used on the Columbia River, the fishermen there being of the opinion that they prevent salmon from entering the nets.

NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF OREGON IN 1904.

How engaged.	Number.
On vessels transporting	84
Inshore or boat fisheries	3,525
On shore, in canneries, etc	1,690
Total	5,299

INVESTMENT IN THE FISHERIES OF OREGON IN 1904.

Item.	Number.	Value.
Vessels transporting	35	$115,700
Tonnage	500	
Outfit		14,350
Boats, sail and row	1,820	213,395
Boats, gasoline	19	25,700
Apparatus—shore fisheries:		
Gill nets (yards, 873,629)	2,631	499,345
Seines (yards, 20,017)	50	25,200
Fyke nets	20	400
Hoop nets and traps	3,429	4,333
Lines		50
Wheels	30	116,000
Tongs, hoes, forks, and shovels		83
Shore and accessory property		1,538,936
Cash capital		1,203,200
Total		3,756,692

PRODUCTS OF THE FISHERIES OF OREGON IN 1904.

Species.	Pounds.	Value.	Species.	Pounds.	Value.
Carp	20,000	$200	Rockfish	21,000	$630
Catfish	180,000	6,000	Sea bass	10,000	1,000
Halibut	25,000	1,750	Shad	36,846	1,433
Herring	18,420	608	Smelt	24,938	739
Perch	4,210	126	Sturgeon	8,854	221
Salmon:			Crabs	246,266	4,398
Blueback, or sock-eye	333,928	12,001	Crawfish	187,200	12,480
Chinook	20,022,216	1,005,960	Clams, soft	[a]31,390	3,071
Dog, or chum	998,825	5,514	Oysters, native	[b]6,944	1,488
Silver	4,255,393	82,956			
Steel head	1,103,802	44,517	Total	27,535,232	1,185,092

[a] 3,139 bushels. [b] 992 bushels.

THE FISHERIES BY COUNTIES.

The fisheries of Oregon in 1904 were prosecuted in 14 counties on the Pacific Ocean and the Oregon side of the Columbia River. The following tables give the number of persons employed, the capital invested, the fisheries in each county, with the catch by each form of fishing apparatus:

Statement, by Counties, of the Number of Persons Employed in the Fisheries of Oregon in 1904.

Counties.	On vessels transporting.	Inshore fisheries.	On shore, in canneries, fish houses, etc.	Total.
Clackamas		54		54
Clatsop	53	2,537	1,078	3,668
Columbia		105	26	131
Coos	5	240	99	344
Curry	8	51	38	97
Douglas	7	23	36	66
Josephine		37		37
Lane		30	24	54
Lincoln		183	98	281
Multnomah	3	88	158	249
Tillamook	8	110	88	206
Wasco		17	45	62
Washington		30		30
Yamhill		20		20
Total	84	3,525	1,690	5,299

Statement, by Counties, of the Vessels, Boats, Apparatus, and other Property Employed in the Fisheries of Oregon in 1904.

Counties.	Vessels transporting.				Boats, sail and row.		Boats, gasoline.		Gill nets.		
	No.	Tonnage.	Value.	Value of outfit.	No.	Value.	No.	Value.	No.	Length (yards).	Value.
Clackamas					27	$640			10	1,500	$600
Clatsop	26	246	$64,700	$7,400	1,202	181,890	15	$20,950	1,742	731,250	441,500
Columbia					43	2,500			5	2,750	1,500
Coos	2	26	5,500	200	144	5,380	2	3,000	217	32,000	12,050
Curry	2	101	12,750	3,950	18	1,800			124	9,850	5,900
Douglas	2	81	24,000	800	83	6,385			197	23,196	11,325
Josephine					24	580			37	3,293	1,310
Lane					15	375			30	9,000	1,500
Lincoln					136	4,520	1	750	151	28,790	9,920
Multnomah	1	5	2,500	300	35	1,850	1	1,000	28	5,000	2,240
Tillamook	2	38	6,250	1,700	55	4,875			90	27,000	11,500
Wasco					5	500					
Washington					17	700					
Yamhill					16	1,400					
Total	35	500	115,700	14,350	1,820	213,395	19	25,700	2,631	873,629	499,345

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND OTHER PROPERTY EMPLOYED IN THE FISHERIES OF OREGON IN 1904—Continued.

Counties.	Seines.			Wheels.		Fyke nets.		Hoop nets and traps.	
	No.	Length (yards).	Value.	No.	Value.	No.	Value.	No.	Value.
Clackamas								615	$755
Clatsop	36	14,790	$19,450						
Columbia	3	1,680	2,000			20	$400	1,199	1,455
Coos	3	900	750					25	38
Curry	3	1,240	900						
Lincoln								180	270
Multnomah	2	640	600	15	$52,000			350	450
Wasco	3	767	1,500	15	64,000				
Washington								560	715
Yamhill								500	650
Total	50	20,017	25,200	30	116,000	20	400	3,429	4,333

Counties.	Value of lines.	Value of tongs, hoes, forks, and shovels.	Shore and accessory property.	Cash capital.	Total investment.
Clackamas			$675		$2,670
Clatsop		$19	1,076,718	$892,200	2,704,827
Columbia			48,075	50,000	105,930
Coos	$50		40,567	37,000	104,535
Curry			53,851	30,000	109,151
Douglas			7,750	20,000	70,260
Josephine			600		2,490
Lane			5,000	5,000	11,875
Lincoln		64	25,900	26,500	67,924
Multnomah			169,150	77,500	307,590
Tillamook			46,000	40,000	110,325
Wasco			64,250	25,000	155,250
Washington			100		1,815
Yamhill					2,050
Total	50	83	1,538,936	1,203,200	3,756,692

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF OREGON IN 1904.

Species.	Clackamas.		Clatsop.		Columbia.		Coos.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Carp					20,000	$200		
Catfish					180,000	6,000		
Halibut							25,000	$1,750
Herring							8,000	400
Rockfish							21,000	630
Salmon:								
Blueback, or sock-eye			544	$35				
Chinook	20,000	$1,000	16,394,089	859,572	235,755	12,055	166,600	7,999
Dog, or chum			19,525	126				
Silver	6,000	300	71,983	1,949	75,360	2,211	1,050,097	28,488
Steelhead	7,968	239	478,070	22,412	30,000	1,350	53,914	2,157
Sea bass							10,000	1,000
Shad			26,846	433			10,000	1,000
Smelt			15,138	151			6,000	360
Sturgeon			8,854	221				
Crabs			650	21			20,000	600
Crawfish	37,800	2,520			35,400	2,360		
Clams, soft			30,100	2,935				
Total	71,768	4,059	17,045,799	887,855	576,515	24,176	1,370,611	44,384

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF OREGON IN 1904—Continued.

Species.	Curry.		Douglas.		Josephine.		Lane.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Salmon:								
Chinook	1,120,000	$28,000	65,000	$2,000	176,040	$7,852	32,000	$435
Dog, or chum			33,000	75				
Silver	227,850	3,417	627,000	9,975			429,000	5,363
Steelhead			150,190	3,130	20,000	1,000		
Total	1,347,850	31,417	875,190	15,180	196,040	8,852	461,000	5,798

Species.	Lincoln.		Multnomah.		Tillamook.		Wasco.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Herring	10,420	$208						
Perch	4,210	126						
Salmon:								
Blueback, or sock-eye			309,940	$10,661			23,444	$1,302
Chinook	165,925	3,318	788,165	39,529	204,000	$4,040	654,642	40,160
Dog, or chum	121,300	613			825,000	4,700		
Silver	927,821	14,391	14,652	439	620,400	9,870	205,230	6,553
Steelhead	8,756	394	184,634	7,966			170,270	5,869
Smelt	3,800	228						
Crabs	225,616	3,777						
Crawfish			22,500	1,500				
Clams, soft	1,290	136						
Oysters, native	6,944	1,488						
Total	1,476,082	24,679	1,319,891	60,098	1,649,400	18,610	1,053,586	53,884

Species.	Washington.		Yamhill.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Carp					20,000	$200
Catfish					180,000	6,000
Halibut					25,000	1,750
Herring					18,420	608
Perch					4,210	126
Rockfish					21,000	630
Salmon:						
Blueback, or sock-eye					333,928	12,001
Chinook					20,022,216	1,005,960
Dog, or chum					998,825	5,514
Silver					4,255,393	82,956
Steelhead					1,103,802	44,517
Sea bass					10,000	1,000
Shad					36,846	1,433
Smelt					24,938	739
Sturgeon					8,854	221
Crabs					246,266	4,398
Crawfish	46,500	$3,100	45,000	$3,000	187,200	12,480
Clams, soft					31,390	3,071
Oysters, native					6,944	1,488
Total	46,500	3,100	45,000	3,000	27,535,232	1,185,092

Statement, by Counties, Apparatus, and Species, of the Yield of the Fisheries of Oregon in 1904.

Apparatus and species.	Clackamas.		Clatsop.		Columbia.		Coos.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.								
Herring							8,000	$400
Salmon:								
Chinook	20,000	$1,000	15,461,680	$810,057	88,755	$4,565	164,200	7,929
Dog, or chum			19,525	126				
Silver	6,000	300	39,740	1,143	65,360	1,961	924,097	26,178
Steelhead	7,968	239	109,414	5,002			53,914	2,157
Shad			15,863	159			10,000	1,000
Smelt			15,138	151			6,000	360
Sturgeon			8,854	221				
Total	33,968	1,539	15,670,214	816,859	154,115	6,526	1,166,211	38,024
SEINES.								
Salmon:								
Blueback, or sock-eye			544	35				
Chinook			932,409	49,515	147,000	7,490	2,400	70
Silver			32,243	806	10,000	250	126,000	2,310
Steelhead			368,656	17,410	30,000	1,350		
Shad			10,983	274				
Total			1,344,835	68,040	187,000	9,090	128,400	2,380
FYKE NETS.								
Carp					20,000	200		
Catfish					180,000	6,000		
Total					200,000	6,200		
LINES.								
Halibut							25,000	1,750
Rockfish							21,000	630
Sea bass							10,000	1,000
Total							56,000	3,380
HOOP NETS AND TRAPS.								
Crabs							20,000	600
Crawfish	37,800	2,520			35,400	2,360		
Total	37,800	2,520			35,400	2,360	20,000	600
FORKS, HOES, SHOVELS, ETC.								
Clams, soft			30,100	2,935				
Crabs			650	21				
Total			30,750	2,956				
Grand total	71,768	4,059	17,045,799	887,855	576,515	24,176	1,370,611	44,384

STATEMENT, BY COUNTIES, APPARATUS, AND SPECIES, OF THE YIELD OF THE FISHERIES OF OREGON IN 1904—Continued.

Apparatus and species.	Curry.		Douglas.		Josephine.		Lane.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.								
Salmon:								
Chinook	746,667	$18,667	65,000	$2,000	176,040	$7,852	32,000	$435
Dog, or chum			33,000	75				
Silver	151,900	2,278	627,000	9,975			429,000	5,363
Steelhead			150,190	3,130	20,000	1,000		
Total	898,567	20,945	875,190	15,180	196,040	8,852	461,000	5,798
SEINES.								
Salmon:								
Chinook	373,333	9,333						
Silver	75,950	1,139						
Total	449,283	10,472						
Grand total	1,347,850	31,417	875,190	15,180	196,040	8,852	461,000	5,798

Apparatus and species.	Lincoln.		Multnomah.		Tillamook.		Wasco.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.								
Herring	10,420	$208						
Perch	4,210	126						
Salmon:								
Blueback, or sock-eye			55,440	$2,218				
Chinook	165,925	3,318	381,897	19,095	204,000	$4,040		
Dog, or chum	121,300	613			825,000	4,700		
Silver	927,821	14,391			620,400	9,870		
Steelhead	8,756	394	16,000	480				
Smelt	3,800	228						
Total	1,242,232	19,278	453,337	21,793	1,649,400	18,610		
SEINES.								
Salmon:								
Blueback, or sock-eye			14,973	599				
Chinook			10,324	516			283,956	$17,037
Silver							95,350	2,861
Steelhead			11,044	441			65,000	1,950
Total			36,341	1,556			444,306	21,848
WHEELS.								
Salmon:								
Blueback, or sock-eye			239,527	7,847			23,444	1,302
Chinook			395,944	19,918			370,686	23,123
Silver			14,652	439			109,880	3,692
Steelhead			157,590	7,045			105,270	3,919
Total			807,713	35,249			609,280	32,036
HOOP NETS AND TRAPS.								
Crabs	225,616	3,777						
Crawfish			22,500	1,500				
Total	225,616	3,777	22,500	1,500				
FORKS, HOES, SHOVELS, ETC.								
Clams, soft	1,290	136						
TONGS.								
Oysters, native	6,914	1,488						
Grand total	1,476,082	24,679	1,319,891	60,098	1,649,400	18,610	1,053,586	53,884

STATEMENT, BY COUNTIES, APPARATUS, AND SPECIES, OF THE YIELD OF THE FISHERIES OF OREGON IN 1904—Continued.

Apparatus and species.	Washington.		Yamhill.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.						
Herring					18,420	$608
Perch					4,210	126
Salmon:						
Blueback, or sock-eye					55,440	2,218
Chinook					17,506,164	878,958
Dog, or chum					998,825	5,514
Silver					3,791,318	71,459
Steelhead					366,242	12,402
Shad					25,863	1,159
Smelt					24,938	739
Sturgeon					8,854	221
Total					22,800,274	973,404
SEINES.						
Salmon:						
Blueback, or sock-eye					15,517	634
Chinook					1,749,422	83,961
Silver					339,543	7,366
Steelhead					474,700	21,151
Shad					10,983	274
Total					2,590,165	113,386
WHEELS.						
Salmon:						
Blueback, or sock-eye					262,971	9,149
Chinook					766,630	43,041
Silver					124,532	4,131
Steelhead					262,860	10,964
Total					1,416,993	67,285
FYKE NETS.						
Carp					20,000	200
Catfish					180,000	6,000
Total					200,000	6,200
LINES.						
Halibut					25,000	1,750
Rockfish					21,000	630
Sea bass					10,000	1,000
Total					56,000	3,380
HOOP NETS AND TRAPS.						
Crabs					245,616	4,377
Crawfish	46,500	$3,100	45,000	$3,000	187,200	12,480
Total	46,500	3,100	45,000	3,000	432,816	16,857
FORKS, HOES, SHOVELS, ETC.						
Clams, soft					31,390	3,071
Crabs					650	21
Total					32,040	3,092
TONGS.						
Oysters, native					6,944	1,488
Grand total	46,500	3,100	45,000	3,000	27,535,232	1,185,092

FISHERIES OF CALIFORNIA.

NOTES AND GENERAL STATISTICS.

The fisheries of California in 1904 represented an investment of $3,764,056, employing 5,530 persons, which, compared with the returns for 1899, is a gain of $989,563 in the amount invested, and 1,556 in the number of persons employed. The fishing is mostly conducted in small boats, of which there were 2,028 in 1904, against 1,355 in 1899, or an increase of 673, of which 231 were fitted with gasoline power. There were 37 fishing vessels and 24 transporters in the deep-sea fisheries, a gain of 4 and 9, respectively, since 1899. These vessels were engaged mainly in the whale and cod fisheries. The aggregate catch of the shore and vessel fisheries was 52,109,654 pounds, valued at $2,523,141, which is a slight decrease since 1899.

The yield of nearly all products except whales and cod shows a gain in 1904, that of salmon, the greatest, amounting to 7,059,458 pounds, which represents an increase of $193,470. The increases in other species were as follows: Flounder and sole, 3,491,304 pounds; barracuda, 967,777 pounds; crabs, 1,433,880 pounds, and striped bass, 336,084 pounds.

Number of Persons Employed in the Fisheries of California in 1904.

How engaged.	Number.
On vessels, fishing	838
On vessels, transporting	77
In shore fisheries	3,491
On shore, in canneries, etc	1,124
Total	5,530

Investment in the Fisheries of California in 1904.

Item.	Number.	Value.
Vessels, fishing	37	$371,800
Tonnage	6,096	
Outfit		223,479
Vessels, transporting	24	100,600
Tonnage	998	
Outfit		11,370
Boats, sail and row	1,798	218,220
Boats, gasoline	231	202,850
Apparatus:		
Vessels, fisheries—		
Seines (913 yards)	5	1,400
Paranzella nets	8	2,800
Gill nets (1,680 yards)	16	880
Trammel nets (2,400 yards)	27	2,700
Trawl and hand lines		1,480
Hoop nets	19	29
Pots	130	180

INVESTMENT IN THE FISHERIES OF CALIFORNIA IN 1904—Continued.

Item.	Number.	Value.
Apparatus—Continued.		
Shore fisheries—		
Seines (30,868 yards)	181	$21,230
Gill nets (431,275 yards)	2,104	226,404
Trammel nets (89,220 yards)	1,042	55,730
Fyke nets	420	4,120
Paranzella nets	24	3,000
Shrimp nets	1,163	23,260
Hoop nets	2,790	5,535
Pots	2,525	3,716
Trawl and hand lines	....	6,062
Tongs, rakes, forks, and hoes	....	523
Abalone outfit	....	1,251
Shore and accessory property	....	1,472,987
Cash capital	....	802,450
Total	....	3,764,056

PRODUCTS OF THE FISHERIES OF CALIFORNIA IN 1904.

[The values in all cases are first prices paid to fishermen. The weights of oysters and clams are net weights, free of shell; in previous reports the weights included shells.]

Species.	Pounds.	Value.
Albacore:		
Fresh	132,689	$1,606
Salted	38,328	1,207
Barracuda:		
Fresh	1,943,159	44,200
Salted	216,123	7,620
Black bass	15,500	1,600
Bonito	212,062	3,075
Carp	70,374	1,407
Catfish	737,144	20,992
Chub mackerel	134,992	3,666
Cod, salted	5,622,944	131,516
Croaker	121,340	3,145
Cultus cod	293,051	8,704
Flounders:		
Fresh	4,312,506	83,230
Salted	23,833	1,191
Hardheads	65,000	2,220
Herring	1,426,442	15,833
Jewfish:		
Fresh	46,741	642
Salted	8,070	264
Kingfish	173,561	3,633
Mullet	12,952	423
Perch	209,272	6,860
Pompano	33,850	4,502
Rockfish:		
Fresh	1,765,824	58,249
Salted	26,943	1,032
Sacramento perch	11,343	554
Sacramento pike	9,500	380
Salmon:		
Blueback, fresh	266,420	3,996
Blueback, salted	6,420	257
Chinook, fresh	8,576,283	308,972
Chinook, salted	3,169,796	135,178
Silver, fresh	266,006	5,483
Silver, salted	3,210	129
Steelhead, fresh	53,284	1,599
Steelhead, salted	1,284	51
Sardines	1,036,470	11,811
Sculpin	2,670	53
Sea bass:		
Fresh	973,384	30,332
Salted	5,140	216

Species.	Pounds.	Value.
Sea trout	78,010	$2,540
Shad	327,372	9,960
Skates	198,186	1,470
Smelts	1,362,442	52,106
Sole	3,873,515	68,912
Spanish mackerel:		
Fresh	615,063	8,634
Salted	93,402	3,070
Striped bass	1,570,404	92,116
Surf-fish	119,060	4,652
Tomcod	69,400	2,776
Whitefish	270,091	3,092
Yellow-fin	15,000	340
Yellow-tail:		
Fresh	189,394	3,421
Salted	84,471	3,030
Other fish	19,110	301
Sea lions	3,250	1,040
Abalone, alive	797,000	7,199
Abalone, meat	27,948	1,956
Abalone shells	8,730	218
Clams:		
Hard	[a] 96,440	10,566
Soft	[b] 139,690	18,334
Oysters:		
Eastern	[c] 1,019,767	536,253
Native	[d] 300,524	91,770
Mussels	[e] 28,215	1,764
Crabs	5,110,560	154,739
Spiny lobsters	1,078,065	43,406
Shrimp (meat)	242,000	29,040
Shrimp in shell	640,000	38,400
Shrimp shells	950,000	4,390
Squid, salted	251,360	10,054
Terrapin	25,500	2,512
Turtles	2,595	104
Whalebone	86,514	375,374
Whale oil	[f] 325,357	17,917
Algæ	59,320	2,267
Other products	7,989	13,590
Total	52,109,654	2,523,141

[a] 12,055 bushels.
[b] 13,969 bushels.
[c] 145,681 bushels.
[d] 42,932 bushels.
[e] 2,821 bushels.
[f] 43,381 gallons.

THE FISHERIES BY COUNTIES.

Humboldt County.—The salmon catch of Eel River in 1904 amounted to 2,728,406 pounds, valued at $43,330; 2,664,206 pounds of this were shipped fresh, and 64,200 pounds salted, nearly all being sent to San Francisco. Of the total catch 2,211,286 pounds were fresh chinook salmon, of which one San Francisco firm handled 520,837 pounds, reshipping the same east as mild cured, frozen, and fresh.

The fisheries of Eel River are of special interest. For many years they were of considerable importance, and the cannery located there made large shipments of fresh and salted salmon. From overfishing the products were reduced to a low ebb, and after the cannery closed the shipments were small. The state placed a close season on the river, and for a number of years gave much attention to restocking the stream. The catch of 1899 compared with 1904 as here given shows the benefit of artificial propagation and legal protection.

SALMON CATCH ON EEL RIVER.

Species.	1899.	1904.
	Pounds.	*Pounds.*
Fresh chinook	176,100	2,211,286
Fresh silver	60,160	133,216
Fresh sockeye	21,600	266,420
Fresh steelhead	113,600	53,284
Total fresh	371,460	2,664,206

In addition to the above, there were put up and shipped 53,286 pounds of salted chinook salmon. The small catch of steelhead is the result of a state law which restricted the fishing for this species to the use of hook and line, thus preventing professional fishermen from operating nets. Of other products than salmon Humboldt County in 1904 yielded 914,886 pounds, valued at $20,793, this output consisting of 485,760 pounds of crabs, worth $9,334; 81,250 pounds of smelts, worth $2,437; $1,477 worth of clams, and $7,545 worth of other fish.

Sacramento County.—The fisheries of this county are of importance chiefly from being near the headwaters of the salmon fisheries of the Sacramento River. The capital invested in the fisheries amounted to $173,215. The products of 1904 amounted to 1,001,431 pounds, worth $39,363. The leading products were 516,823 pounds of fresh chinook salmon, 361,923 pounds of catfish, 71,442 pounds of striped bass, and 51,243 pounds of other fish.

Santa Cruz County.—The fisheries of this county show quite a gain in the number of persons engaged, amount of capital invested, and products taken since 1899. In 1904 there were 91 persons engaged and a capital of $33,745 employed. The products amounted to 1,093,386 pounds in 1904, compared with 677,578 pounds in 1899. These were

shipped from Santa Cruz, Capitola, and Aptos, mostly by express, a small quantity by steamer and railroad freight. A considerable quantity also was used locally and peddled through the interior. New and prolific rockfish grounds were found 9 to 15 miles southwest from Light-House Point. Nets are set mostly in Monterey Bay, where barracuda, sea bass, bonito, sole, and a few mackerel are taken off Aptos. The season for sea bass and smelt is from May to December; for barracuda, from June to December; salmon, from January to February, and again from May until September 10; perch, rockfish, and cultus cod, all the year; sardines, though of very uncertain occurrence, are taken from May to October; mackerel, at times from July to October, and bonito, from June to December. At the beginning of the run salmon are taken from 9 to 15 miles southwest from Light-House Point, and later 8 to 10 miles farther south. Fishing for salmon is now carried on chiefly in the vicinity of Monterey, with troll lines.

Monterey County.—The fisheries of this county in 1904 were represented by $84,177 in capital, and 2,574,939 pounds of products, valued at $62,684. Monterey is the extreme southern migratory point for salmon and shad, and the northern limit for spiny lobsters. Salmon in any considerable amount have been taken in Monterey Bay only since 1900, during which period the catch has increased. They occur in all parts of the bay as far as Point Cypress. In 1904 the fishing began on May 27 and lasted until August 6. The catch was made with trolling hooks and lines, handled by 125 Japanese and 50 white men, who used 175 small sloop-rigged boats, 20 rowboats, and 3 gasoline boats, with one man to each. Sardines are used as bait, a whole fish being placed on the hook. The catch in 1904 comprised 132,790 pounds of silver and 531,110 pounds of chinook salmon. Of this, 139,440 pounds of chinook and 34,860 pounds of silver salmon, net weight, were packed as slack salted. The following products were expressed fresh or used locally in Monterey County: 331,960 pounds of chinook salmon, 82,990 pounds of silver salmon, and 535,000 pounds of other species, making a total of 949,950 pounds. Of this quantity the Wells-Fargo Express handled 657,950 pounds of fresh fish, 21,966 pounds of dry abalone meat, and 3,205 pounds of mussels.

Silver salmon weigh from 4 to 10 pounds each, the average being 6 pounds. Chinook run from 2 to 53 pounds each, or an average of 15 pounds. The fishermen receive 3 cents per pound for salmon as they come from the water.

Santa Barbara County.—This county has a number of fishing grounds around the Santa Barbara Islands and in the channel. With good railroad facilities for shipment of the fish, and the proximity of Los Angeles, with its large demands from the interior, in addition to other advantages, the fisheries of this section could be largely increased. They are now represented by $15,441 in capital, 53 small sailboats and

5 gasoline boats. The products in 1904 amounted to 913,140 pounds, worth $36,023, of which output 650,346 pounds were spiny lobsters, which are more plentiful in this section than anywhere on the Pacific coast.

Gill nets and lobster pots are set about one mile from the wharf at Santa Barbara, and about the islands of Santa Barbara, Santa Rosa, and Santa Cruz. Five Chinese on Santa Cruz Islands and 2 on Santa Barbara Islands are engaged in fishing. Their output in 1904 amounted to 13,430 pounds of abalone meat, 8,730 pounds of abalone shells, and 18,910 pounds of seaweed. Two Chinese also fished for abalone around San Miguel Islands. Here the abalone are pried from the rocks at low tide, none being found in deep water. The fishing is carried on during April, May, June, July, and August. Seaweed also is pulled from the rocks at low tide. After being given one washing it is dried on the shore, packed in bales, and shipped to San Francisco. During April and May sea lions are taken alive from Ana Capa and Santa Barbara islands, 26 being captured during 1904. These animals have been so much hunted that they now resort to the caves on the islands, but thither they are followed. The hunters enter the caves in boats and fire off guns, which frighten the sea lions out into a strong gill net which has been stretched across the opening of the cave. Animals of proper size are shipped to various parts of the world for exhibition purposes; the others are killed for their pelts. One hundred and fifty young lions and pups were killed recently. The nets used in their capture are 15 fathoms long by 4 fathoms deep, with an 8-inch mesh.

Sea otters were formerly plentiful around the Santa Barbara Islands, but they are now nearly exterminated. The only one reported in 1904 was shot off San Miguel Islands and sold for $250.

San Luis Obispo County.—The fisheries of Port Harford for many years were of considerable importance. The shipments in 1899 amounted to 341,330 pounds. In years past the harbor was full of kelp, among which were many species of fish; gulls and pelicans in large numbers followed the fish quite near to the wharf; and the adjacent rocks were rookeries for sea lions, of which many were killed for oil and pelts. Within the past few years, however, tank oil steamers which have loaded here with oil, on their return pumped their water ballast into the harbor to the destruction of the fishing industry. All marine plant life and shellfish soon died and the fishermen were forced to leave. For a time Monterey labored under the same conditions, but the city authorities passed a law protecting the fishermen from oil steamers.

Ventura County.—The principal port of this county is Ventura, a few miles southeast from Santa Barbara. Like the latter it is quite near valuable fishing grounds, and in a rich, well-settled country, with rail-

road facilities to a large market. Neither of the two places, so far as the fisheries are concerned, has taken advantage of the favorable conditions, though Ventura shows some gain during the past few years, its fisheries having increased from an investment of $638 in 1899 to $4,875 in 1904, and its products from 74,000 pounds in 1899 to 354,842 pounds in 1904, the latter consisting of 137,314 pounds of spiny lobsters, 104,800 pounds of flounders, and 112,728 pounds of other products.

Los Angeles County.—This county ranks second in the state in the amount of capital invested and number of persons engaged, and third in the amount of products taken. Compared with 1899, its fisheries show a gain of $390,342 in the amount of capital invested, 269 in the number of persons engaged, and 582,418 pounds, valued at $21,509, in the amount and value of products taken. The leading fishing stations are located at San Pedro, Redondo, Long Beach, Santa Monica, Wilmington, and Ocean Park. All of them are within 25 miles of Los Angeles, the receiving and distributing point.

The aggregate product yielded by the fisheries of the county in 1904 was 4,542,480 pounds, valued at $103,880 to the fishermen. The following were the leading species, with the quantity of each: Barracuda, 1,188,230 pounds; bastard halibut (tabulated under flounders), 839,465 pounds; Spanish mackerel, 507,700 pounds; rockfish, 636,456 pounds; sardines, 321,900 pounds; smelt, 134,307 pounds; sea bass, 75,082 pounds; chub mackerel, 66,392 pounds; perch, 57,500 pounds; yellow-tail, 59,545 pounds; abalone, 196,518 pounds, and spiny lobsters, 47,002 pounds.

The following increases since 1899 are worthy of note: Barracuda, 799,865 pounds; rockfish, 392,456 pounds; abalone, 132,588 pounds; chub mackerel, 17,152 pounds, and Spanish mackerel, 507,700 pounds. The decrease in some species is also noticeable, that of spiny lobsters being 93,884 pounds; smelts, 28,855 pounds. and sardines, 693,100 pounds.

The increase in the fisheries of Los Angeles County is largely due to the recent use of gasoline boats, of which there are 39, worth $50,600. These boats carry double the crew and nets used by the small sail boats, and make quick trips, leaving early every morning and returning in time to have the day's catch landed, packed, and on the evening express train.

Spiny lobsters are packed in ½ and 1 pound cans, lined with parchment paper and labeled "lobsters." The spiny lobsters weigh, as taken from the water, on an average 3 pounds each, and some as much as 18 pounds. The present state law concerning both abalone and lobsters is said to have been beneficial. These species were reported more abundant in 1904 than during the preceding five years. Spiny lobsters, either fresh or canned, are a very good substitute for the genuine lobster, of which none is found on the Pacific coast.

The cannery at East San Pedro in 1904 packed 188 cases of lobsters in ½-pound cans (4 dozen to the case) and 1,857 cases of 1-pound cans (4 dozen to the case), 5,000 pounds of dried abalones, and 54,709 pounds of abalone shells.

Orange County.—The fisheries of this county are prosecuted by men from Newport and the products shipped by express from that point. The catch in 1904 amounted to 478,492 pounds, or a gain of 123,075 pounds since 1899. The shipments consisted chiefly of rockfish, smelts, and halibut, taken on the local fishing grounds.

San Diego County.—The fisheries of this county show a small gain in capital, number of persons engaged, and amount of products taken. The aggregate catch in 1904 was 2,249,192 pounds of fishery products, with a value to the fishermen of $58,195. The leading species handled were barracuda, fresh, 451,318 pounds; salted, 211,753 pounds; bastard halibut (tabulated under flounders), 375,265 pounds; rockfish, 277,529 pounds; spiny lobsters, 176,336 pounds.

The dried and pickled fish were all caught and prepared for market by 17 fishermen of La Playa, just across the bay from San Diego. Each of these men has a gasoline boat put into use since 1899. The catch has been increased but little, even with gasoline boats, as the men are not desirous of taking more fish than they can handle readily. One man goes in a boat during the summer and two in the winter.

Albacore, barracuda, chub mackerel, and yellow-tail are taken by trolling with spoon hooks; jewfish and rockfish by a perpendicular troll, which is used from the boats in from 50 to 100 fathoms of water; each line has from 50 to 75 hooks attached to short snoods placed about 1 foot apart on the line. Next to lines, the most important apparatus are trammel nets and lobster pots.

The fishing grounds of the county are chiefly from Point Loma north 25 miles, and, at times, 30 miles south of that point.

The following tables give by counties the number of persons employed, the amount of capital invested, and the quantity and value of the products of the fisheries of California in 1904; also the catch taken in the vessel and shore fisheries by each form of fishing apparatus:

STATEMENT, BY COUNTIES, OF THE NUMBER OF PERSONS EMPLOYED IN THE FISHERIES OF CALIFORNIA IN 1904.

Counties.	On vessels fishing.	On vessels transporting.	In shore fisheries.	On shore in canneries, etc.	Total.
Alameda			28		28
Butte			30		30
Contra Costa		12	438	78	528
Del Norte			42	27	69
Humboldt	3		274	4	281
Los Angeles	24	9	334	200	567
Marin			229	7	236
Monterey			174	151	325
Orange			30		30
Sacramento		4	190	37	231
San Diego	8		136	35	179
San Francisco	799	45	757	505	2,106
San Joaquin			72	9	81
San Mateo			29	6	35
Santa Barbara	4		89		93
Santa Cruz			85	6	91
Shasta			6		6
Solano		7	377	59	443
Sutter			17		17
Tehama			36		36
Ventura			39		39
Yola			79		79
Total	838	77	3,491	1,124	5,530

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND CAPITAL EMPLOYED IN THE FISHERIES OF CALIFORNIA IN 1904.

Counties.	Vessels fishing.				Vessels transporting.				Boats (sail and row).	
	No.	Tonnage.	Value.	Value of outfit.	No.	Tonnage.	Value.	Value of outfit.	No.	Value.
Alameda									15	$375
Butte									10	400
Contra Costa					6	62	$9,200	$1,795	210	55,600
Del Norte									21	1,050
Humboldt	1	55	$5,000	$720					133	3,930
Los Angeles	6	58	14,400	4,090	3	33	7,600	1,425	178	14,670
Marin									119	8,150
Monterey									200	10,911
Orange									22	690
Sacramento					1	59	6,000	400	133	11,665
San Diego	3	21	4,300	720					78	4,054
San Francisco	26	5,951	346,500	217,699	10	805	64,500	6,750	182	44,825
San Joaquin									72	1,290
San Mateo									12	1,775
Santa Barbara	1	11	1,600	250					53	1,750
Santa Cruz									78	7,805
Shasta									3	120
Solano					4	39	13,300	1,000	185	45,305
Sutter									11	365
Tehama									12	480
Ventura									29	1,240
Yola									42	1,770
Total	37	6,096	371,800	223,479	24	998	100,600	11,370	1,798	218,220

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND CAPITAL EMPLOYED IN THE FISHERIES OF CALIFORNIA IN 1904—Continued.

Counties.	Boats (gasoline).		Apparatus used in the vessel fisheries.							
			Seines.			Paranzella nets.		Gill nets.		
	No.	Value.	No.	Length (yards).	Value.	No.	Value.	No.	Length (yards).	Value.
Contra Costa	8	$8,150								
Humboldt	16	13,650								
Los Angeles	39	50,600	3	613	$1,250			16	1,680	$880
Marin	10	7,000								
Monterey	4	6,100								
Sacramento	2	5,200								
San Diego	44	33,350								
San Francisco	99	69,300				8	$2,800			
Santa Barbara	5	6,000	2	300	150					
Santa Cruz	1	700								
Solano	3	2,800								
Total	231	202,850	5	913	1,400	8	2,800	16	1,680	880

Counties.	Apparatus used in the vessel fisheries.							
	Trammel nets.			Value of trawl and hand lines.	Hoop nets.		Pots.	
	No.	Length (yards).	Value.		No.	Value.	No.	Value.
Humboldt				$30				
Los Angeles	27	2,400	$2,700	170			30	$30
San Diego				45	19	$29	100	150
San Francisco				1,235				
Total	27	2,400	2,700	1,480	19	29	130	180

Counties.	Apparatus used in the shore fisheries.								
	Seines.			Gill nets.			Trammel nets.		
	No.	Length (yards).	Value.	No.	Length (yards).	Value.	No.	Length (yards).	Value.
Butte				10	1,000	$1,000			
Contra Costa	3	600	$300	242	138,600	66,200			
Del Norte				21	3,360	5,250			
Humboldt	18	3,450	2,925	97	9,850	6,880			
Los Angeles	26	4,066	3,060	214	31,520	11,190	500	47,120	$42,160
Marin	15	1,500	1,500	30	8,000	3,600	15	1,250	450
Monterey	23	1,260	2,800	55	4,710	1,715			
Orange	13	3,200	1,070	21	2,100	410	43	4,300	860
Sacramento	3	750	450	77	30,800	9,625			
San Diego	6	3,600	600	127	9,115	2,594	136	10,800	3,380
San Francisco	15	1,125	1,875	582	40,900	43,000	154	7,700	3,080
San Joaquin	40	8,000	3,500	21	8,400	4,200			
Santa Barbara				48	2,580	1,020	69	5,950	1,900
Santa Cruz	10	1,650	2,050	298	22,140	12,320	95	7,600	2,700
Shasta				3	300	300			
Solano				209	108,300	52,900			
Sutter				6	600	600			
Tehama				12	1,200	1,200			
Ventura	5	667	500	10	1,500	300	30	4,500	1,200
Yola	4	1,000	600	21	6,300	2,100			
Total	181	30,868	21,230	2,104	431,275	226,404	1,042	89,220	55,730

STATEMENT, BY COUNTIES, OF THE VESSELS, BOATS, APPARATUS, AND CAPITAL EMPLOYED IN THE FISHERIES OF CALIFORNIA IN 1904—Continued.

Counties.	Apparatus used in the shore fisheries.									
	Fyke nets.		Paranzella nets.		Shrimp nets.		Hoop nets.		Pots.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Contra Costa					200	$4,000				
Humboldt							348	$696		
Los Angeles									125	$190
Marin					563	11,260	240	480		
Orange									190	285
Sacramento	150	$1,500								
San Diego									555	832
San Francisco			20	$2,000	200	4,000	2,112	4,224	220	440
San Joaquin	70	620								
San Mateo					200	4,000				
Santa Barbara							60	90	1,110	1,481
Santa Cruz			4	1,000						
Sutter	50	500								
Ventura							30	45	325	488
Yola	150	1,500								
Total	420	4,120	24	3,000	1,163	23,260	2,790	5,535	2,525	3,716

Counties.	Value of trawl and hand lines.	Value of tongs, rakes, forks, and hoes.	Value of abalone outfit.	Shore and accessory property.	Cash capital.	Total investment.
Alameda		$115				$490
Butte				$1,000		2,400
Contra Costa		20		98,825	$55,000	299,090
Del Norte				37,000	10,000	53,300
Humboldt	$60	10		11,950		45,851
Los Angeles	1,186	29	$918	228,700	118,450	503,698
Marin	100	100		5,800		38,440
Monterey	436	5	310	27,900	34,000	84,177
Orange	200			300		3,815
Sacramento	75			64,300	74,000	173,215
San Diego	1,895			21,975	6,000	79,924
San Francisco	450	235		893,037	452.000	2,157,950
San Joaquin	250			6,500	2,000	18,360
San Mateo		7	8	4,000	1,000	10,790
Santa Barbara	185		15	1,000		15,441
Santa Cruz	870			6,300		33,745
Shasta				200		620
Solano	5			57,600	50,000	222,910
Sutter				800		2,265
Tehama				1,000		2,680
Ventura	300	2		800		4,875
Yola	50			4,000		10,020
Total	6,062	523	1,251	1,472,987	802,450	3,764,056

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF CALIFORNIA IN 1904.

Species.	Alameda.		Butte.		Contra Costa.		Del Norte.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass					9,000	$1,080		
Carp					374	7		
Catfish					18,000	540		
Hardheads					19,000	380		
Salmon:								
Chinook, fresh			220,316	$8,812	2,421,518	117,623	478,000	$7,170
Chinook, salted					1,111,500	50,018	10,000	350
Sea bass, fresh					1,459	44		
Shad					89,221	1,741		
Striped bass					562,858	22,615		
Clams, soft	42,860	$6,250			51,580	5,497		
Oysters, eastern	49,098	21,854						
Mussels	25,000	1,700						
Shrimp (meat)					80,000	9,600		
Shrimp in shell					400,000	24,000		
Shrimp shells					300,000	1,500		
Total	116,958	29,804	220,316	8,812	5,064,510	234,648	488,000	7,520

Species.	Humboldt.		Los Angeles.		Marin.		Monterey.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Albacore, fresh			83,258	$952				
Barracuda:								
Fresh			1,188,230	26,603			150,000	$4,500
Salted							4,370	219
Bonito			75,612	1,418			25,000	250
Chub mackerel			66,392	1,448			20,000	600
Croaker			15,680	399				
Cultus cod	14,000	$420	4,700	141				
Flounders:								
Fresh	156,000	4,600	850,765	21,551			30,000	900
Salted							23,833	1,191
Herring	35,000	525			32,532	$650	8,000	120
Jewfish, fresh			10,120	51				
Kingfish			25,505	399			25,000	750
Perch	4,000	80	57,500	1,685	61,170	2,446	13,000	420
Pompano			17,200	1,797				
Rockfish:								
Fresh	60,000	1,800	636,456	18,747	31,789	1,272	100,500	3,015
Salted							16,172	689
Salmon:								
Blueback, fresh	266,420	3,996						
Blueback, salted	6,420	257						
Chinook, fresh	2,211,286	33,169					531,110	15,935
Chinook, salted	53,286	2,131						
Silver, fresh	133,216	1,998					132,790	3,485
Silver, salted	3,210	129						
Steelhead, fresh	53,284	1,599						
Steelhead, salted	1,284	51						
Sardines	2,000	60	321,900	3,220			450,000	4,500
Sculpin			2,670	53				
Sea bass:								
Fresh			75,082	2,252	70,917	2,128	150,900	4,527
Salted							5,140	216
Sea trout			64,200	1,988				
Smelt	81,250	2,437	134,307	4,695	77,805	3,112	30,000	1,200
Spanish mackerel, fresh			507,700	6,193			1,000	30
Striped bass					22,224	889	12,000	840
Surf-fish	4,000	120	38,360	1,151				
Whitefish			19,470	570				
Yellowfin			8,000	200				
Yellow-tail, fresh			59,545	1,056			5,500	160
Abalone, alive			182,000	1,274			540,000	5,400
Abalone meat			14,518	1,016				
Clams:								
Hard	6,896	1,227	35,688	2,896	51,408	6,141	1,920	182
Soft	1,780	250	620	87				
Mussels							3,215	64
Crabs	485,760	9,334			408,000	12,750		
Spiny lobsters			47,002	2,038				
Shrimp (meat)					102,000	12,240		
Shrimp in shell					240,000	14,400		
Shrimp shells					400,000	1,640		
Squid, dry							251,360	10,054
Algæ							40,410	1,416
Other products							3,719	2,021
Total	3,579,092	64,183	4,542,480	103,880	1,497,845	57,668	2,574,939	62,684

Statement, by Counties and Species, of the Yield of the Fisheries of California in 1904—Continued.

Species.	Orange.		Sacramento.		San Diego.		San Francisco.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Albacore:								
Fresh					41,431	$414		
Salted					38,328	1,207		
Barracuda:								
Fresh	25,000	$625			451,318	9,051		
Salted					211,753	7,401		
Black bass			2,000	$160				
Bonito	15,000	300						
Carp			6,000	120				
Catfish			361,923	9,064				
Chub mackerel	8,000	240			500	15		
Cod, salted							5,622,944	$131,516
Croaker	33,700	843			66,960	1,778		
Cultus cod							235,600	7,068
Flounders, fresh	101,400	2,560			378,725	9,268	2,625,316	40,029
Herring					6,910	138	1,344,000	14,400
Jewfish:								
Fresh					31,621	461		
Salted					8,070	264		
Kingfish					6,905	138	106,000	2,120
Mullet	6,000	180			5,452	198		
Perch	5,200	150			8,452	194	20,000	800
Pompano	800	80			1,000	100		
Rockfish:								
Fresh	48,000	1,440			277,529	5,902	426,800	20,340
Salted					10,771	343		
Sacramento perch			6,343	254				
Salmon, chinook, fresh			516,823	26,289			84,000	3,360
Sardines					6,820	136	210,000	3,150
Sea bass, fresh	10,000	300			69,053	1,727	215,000	6,450
Sea trout					13,810	552		
Shad			34,900	1,047			109,600	4,384
Skates							198,186	1,470
Smelt	79,225	2,377			12,905	387	822,000	32,880
Sole					10,357	207	3,821,408	67,470
Spanish mackerel:								
Fresh	8,000	240			87,863	1,758		
Salted					93,402	3,070		
Striped bass			71,442	2,267			714,000	57,110
Surf-fish	33,100	993			17,000	510	21,600	1,728
Tomcod							69,400	2,776
Whitefish	6,000	180			29,621	592	208,000	1,540
Yellowfin	7,000	140						
Yellow-tail:								
Fresh	25,000	500			85,624	1,335		
Salted					81,471	3,030		
Other fish					13,610	136		
Clams, soft							25,710	3,750
Oysters:								
Eastern							970,669	514,399
Native							300,524	91,770
Crabs							4,216,800	132,655
Spiny lobsters	67,067	2,682			176,336	7,779		
Shrimp (meat)							36,000	4,320
Shrimp shells							150,000	750
Terrapin			2,000	162				
Turtles					2,595	104		
Whalebone							86,514	375,374
Whale oil							325,357	17,917
Other products							1,220	11,193
Total	478,492	13,830	1,001,431	39,363	2,249,192	58,195	22,966,648	1,550,719

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF CALIFORNIA IN 1904—Continued.

Species.	San Joaquin.		San Mateo.		Santa Barbara.		Santa Cruz.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Albacore, fresh					8,000	$240		
Barracuda, fresh					45,611	1,658	82,500	$1,750
Bonito					3,000	90	85,250	853
Carp	60,000	$1,200						
Catfish	146,821	6,666						
Chub mackerel					500	20	39,100	1,333
Cultus cod							38,751	1,075
Flounders, fresh					50,000	1,380	15,500	310
Hardheads	38,000	1,520						
Jewfish, fresh					3,000	90		
Kingfish					1,000	30	2,151	56
Perch					2,000	60	32,950	900
Pompano							10,850	2,015
Rockfish, fresh					23,000	690	131,250	4,108
Sacramento pike	9,500	380						
Salmon, chinook, fresh	90,000	4,500					155,249	8,642
Sardines							45,750	745
Sea bass, fresh					46,000	1,800	319,973	10,579
Shad	78,000	2,340						
Smelt	8,000	320			1,313	66	90,637	3,882
Sole							41,750	1,235
Spanish mackerel, fresh					10,000	400		
Striped bass	73,000	3,000						
Surf fish					1,000	30		
Whitefish					7,000	210		
Yellow-tail, fresh					9,000	270	1,725	35
Other fish					5,000	150		
Sea lions					3,250	1,040		
Abalone, alive			75,000	$525				
Abalone meat					13,130	940		
Abalone shells					8,730	218		
Clams, soft			17,140	2,500				
Spiny lobsters					650,346	25,414		
Shrimp (meat)			24,000	2,880				
Shrimp shells			100,000	500				
Terrapin	23,500	2,350						
Algæ					18,910	851		
Other products					3,050	376		
Total	526,821	22,276	216,140	6,405	913,140	36,023	1,093,386	37,548

Species.	Shasta.		Solano.		Sutter.		Tehama.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass					3,000	$240		
Catfish			1,400	$42	50,000	1,500		
Hardheads					4,000	160		
Sacramento perch					1,000	40		
Salmon:								
Chinook, fresh	50,000	$2,500	1,411,902	63,109	90,000	4,500	172,079	$6,883
Chinook, salted			1,995,010	82,679				
Shad			6,651	175			4,000	120
Striped bass			94,880	3,795				
Total	50,000	2,500	3,509,843	149,800	148,000	6,440	176,079	7,003

Species.	Ventura.		Yolo.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Albacore:						
Fresh					132,689	$1,606
Salted					38,328	1,207
Barracuda:						
Fresh	500	$13			1,943,159	44,200
Salted					216,123	7,620
Black bass			1,500	$120	15,500	1,600
Bonito	8,200	164			212,062	3,075
Carp			4,000	80	70,374	1,407
Catfish			159,000	3,180	737,144	20,992
Chub mackerel	500	10			134,992	3,666
Cod, salted					5,622,944	131,516
Croaker	5,000	125			121,340	3,145
Cultus cod					293,051	8,704

STATEMENT, BY COUNTIES AND SPECIES, OF THE YIELD OF THE FISHERIES OF CALIFORNIA IN 1904—Continued.

Species.	Ventura.		Yolo.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Flounders:						
Fresh	104,800	$2,632			4,312,506	$83,230
Salted					23,833	1,191
Hardheads			4,000	$160	65,000	2,220
Herring					1,426,442	15,833
Jewfish:						
Fresh	2,000	40			46,741	642
Salted					8,070	264
Kingfish	7,000	140			173,561	3,633
Mullet	1,500	45			12,952	423
Perch	5,000	125			209,272	6,860
Pompano	4,000	480			33,850	4,502
Rockfish:						
Fresh	30,500	935			1,765,824	58,249
Salted					26,943	1,032
Sacramento perch			4,000	260	11,343	554
Sacramento pike					9,500	380
Salmon:						
Blueback, fresh					266,420	3,996
Blueback, salted					6,420	257
Chinook, fresh			144,000	6,480	8,576,283	308,972
Chinook, salted					3,169,796	135,178
Silver, fresh					266,006	5,483
Silver, salted					3,210	129
Steelhead, fresh					53,284	1,599
Steelhead, salted					1,284	51
Sardines					1,036,470	11,811
Sculpin					2,670	53
Sea bass:						
Fresh	15,000	525			973,384	30,332
Salted					5,140	216
Sea trout					78,010	2,540
Shad			5,000	150	327,372	9,960
Skates					198,186	1,470
Smelt	[illegible]	750			1,362,442	52,106
Sole					3,873,515	68,912
Spanish mackerel:						
Fresh	500	13			615,063	8,634
Salted					93,402	3,070
Striped bass			20,000	1,600	1,570,404	92,116
Surf-fish	4,000	120			119,060	4,652
Tomcod					69,400	2,776
Whitefish					270,091	3,092
Yellow-fin					15,000	340
Yellow-tail:						
Fresh	3,000	65			189,394	3,421
Salted					84,471	3,030
Other fish	500	15			19,110	301
Sea lions					3,250	1,040
Abalone, alive					797,000	7,199
Abalone meat					27,948	1,956
Abalone shells					8,730	218
Clams:						
Hard	528	120			96,440	10,566
Soft					139,690	18,334
Oysters:						
Eastern					1,019,767	536,253
Native					300,524	91,770
Mussels					28,215	1,764
Crabs					5,110,560	[illegible]
Spiny lobsters	137,314	5,493			1,078,065	[illegible]
Shrimp (meat)					242,000	[illegible]
Shrimp in shell					640,000	[illegible]
Shrimp shells					950,000	4,390
Squid, dry					251,360	10,054
Terrapin					25,500	2,512
Turtles					2,595	104
Whalebone					86,514	375,374
Whale oil					325,357	17,917
Algæ					59,320	2,267
Other products					7,989	13,590
Total	354,842	11,810	341,500	12,030	52,109,654	2,523,141

STATEMENT, BY COUNTIES, APPARATUS, AND SPECIES, OF THE YIELD OF THE VESSEL FISHERIES OF CALIFORNIA IN 1904.

Apparatus and species.	Humboldt.		Los Angeles.		San Diego.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Gill nets:						
Albacore			7,420	$185		
Barracuda			85,150	2,129		
Bonito			6,000	150		
Chub mackerel			5,280	132		
Flounders			13,370	334		
Pompano			1,900	304		
Spanish mackerel			10,120	253		
Total			129,240	3,487		
Trammel nets:						
Barracuda			20,400	510		
Bonito			16,112	403		
Chub mackerel			5,280	132		
Flounders			43,630	1,090		
Pompano			1,900	152		
Spanish mackerel			10,120	253		
Total			97,442	2,540		
Seines:						
Pompano			1,500	150		
Sardines			321,900	3,220		
Spanish mackerel			426,300	4,263		
Total			749,700	7,633		
Lines:						
Albacore			50,000	250		
Barracuda					27,000	$540
Bonito			16,000	240		
Cultus cod	4,000	$120				
Flounders	30,000	1,050				
Jewfish					4,000	60
Rockfish	20,000	600	122,953	3,228	16,500	382
Spanish mackerel					5,000	100
Whitefish					2,000	40
Yellow-tail					6,300	94
Total	54,000	1,770	188,953	3,718	60,800	1,216
Hoop nets and pots: Spiny lobsters			30,000	1,350	22,550	902
Grand total	54,000	1,770	1,195,335	18,728	83,350	2,118

Apparatus and species.	San Francisco.		Santa Barbara.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Paranzella nets:						
Cultus cod	124,000	$3,720			124,000	$3,720
Flounders	567,916	9,168			567,916	9,168
Kingfish	106,000	2,120			106,000	2,120
Rockfish	50,000	1,500			50,000	1,500
Sea bass	145,000	4,350			145,000	4,350
Skates	198,186	1,470			198,186	1,470
Sole	3,785,408	66,030			3,785,408	66,030
Tom cod	55,000	2,200			55,000	2,200
Whitefish	208,000	1,540			208,000	1,540
Crabs	198,000	6,600			198,000	6,600
Total	5,437,510	98,698			5,437,510	98,698
Gill nets:						
Albacore					7,420	185
Barracuda					85,150	2,129
Bonito					6,000	150
Chub mackerel					5,280	132
Flounders					13,370	334
Pompano					1,900	304
Spanish mackerel					10,120	253
Total					129,240	3,487

STATEMENT, BY COUNTIES, APPARATUS, AND SPECIES, OF THE YIELD OF THE VESSEL FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	San Francisco.		Santa Barbara.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Trammel nets:						
Barracuda					20,400	$510
Bonito					16,112	403
Chub mackerel					5,280	132
Flounders					43,630	1,090
Pompano					1,900	152
Spanish mackerel					10,120	253
Total					97,442	2,540
Seines:						
Pompano					1,500	150
Sardines					321,900	3,220
Spanish mackerel					426,300	4,263
Total					749,700	7,633
Lines:						
Albacore					50,000	250
Barracuda					27,000	540
Bonito					16,000	240
Cod, salted	5,622,944	$131,516			5,622,944	131,516
Cultus cod					4,000	120
Flounders					30,000	1,050
Jewfish					4,000	60
Rockfish					159,453	4,210
Spanish mackerel					5,000	100
Whitefish					2,000	40
Yellow-tail					6,300	94
Total	5,622,944	131,516			5,926,697	138,220
Hoop nets and pots: Spiny lobsters					52,550	2,252
Miscellaneous apparatus:						
Sea lions (alive)			3,250	$1,040	3,250	1,040
Sea-lion pelts, whiskers, and trimmings			3,020	126	3,020	126
Sea-otter pelts			30	250	30	250
Whalebone	86,514	375,374			86,514	375,374
Trade bone	1,220	4,745			1,220	4,745
Ivory		1,395				1,395
Furs		5,053				5,053
Whale oil	314,017	17,161			314,017	17,161
Sperm oil	11,340	756			11,340	756
Total	413,091	404,484	6,300	1,416	419,391	405,900
Grand total	11,473,545	634,698	6,300	1,416	12,812,530	658,730

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904.

Apparatus and species.	Alameda.		Butte.		Contra Costa.		Del Norte.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Black bass					9,000	$1,080		
Catfish					18,000	540		
Hardheads					19,000	380		
Striped bass					148,744	5,950		
Total					194,744	7,950		
GILL NETS.								
Carp					374	7		
Salmon:								
Chinook, fresh			220,316	$8,812	2,421,518	117,623	478,000	$7,170
Chinook, salted					1,111,500	50,018	10,000	350
Sea bass, fresh					1,459	44		
Shad					89,221	1,744		
Striped bass					414,114	16,665		
Total			220,316	8,812	4,038,186	186,101	488,000	7,520
SHRIMP NETS.								
Shrimp meat					80,000	9,600		
Shrimp in shell					400,000	24,000		
Shrimp shells					300,000	1,500		
Total					780,000	35,100		
TONGS, RAKES, FORKS, HOES, ETC.								
Clams, soft	42,860	$6,250			51,580	5,497		
Oysters, eastern	49,098	21,854						
Mussels	25,000	1,700						
Total	116,958	29,804			51,580	5,497		
Grand total	116,958	29,804	220,316	8,812	5,064,510	234,648	488,000	7,520

Apparatus and species.	Humboldt.		Los Angeles.		Marin.		Monterey.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Bonito			4,166	$63				
Croaker			15,680	399				
Flounders	40,000	$1,000						
Herring	25,000	375			16,344	$326	8,000	$120
Kingfish			3,320	66				
Perch			49,500	1,485	42,680	1,707	3,000	120
Pompano			6,200	600				
Rockfish							500	15
Salmon:								
Chinook, fresh	737,095	11,056						
Chinook, salted	17,762	710						
Silver, fresh	44,405	666						
Silver, salted	1,070	43						
Blueback, or sock-eye, fresh	88,806	1,332						
Blueback, or sock-eye, salted	2,140	86						
Steelhead, fresh	17,761	533						
Steelhead, salted	428	17						
Sardines							450,000	4,500
Sea bass							900	27
Smelt	16,250	487	116,732	4,168	28,300	1,132	10,000	600
Spanish mackerel							1,000	30
Striped bass							12,000	840
Surf-fish	4,000	120	38,360	1,151				
Yellow-fin			4,000	100				
Yellow-tail							500	10
Squid, salted							251,360	10,054
Total	994,717	16,425	237,958	8,032	87,324	3,165	737,260	16,316

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	Humboldt.		Los Angeles.		Marin.		Monterey.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.								
Barracuda, fresh			884,740	$19,966			150,000	$4,500
Barracuda, salted							4,370	219
Bonito			4,166	62			25,000	250
Chub mackerel			11,250	225			20,000	600
Flounders, fresh							20,000	600
Flounders, salted							11,413	570
Herring	10,000	$150			16,188	$324		
Kingfish			16,639	250			25,000	750
Perch			8,000	200			10,000	300
Pompano			2,500	225				
Rockfish, salted							4,200	210
Salmon:								
Chinook, fresh	1,474,191	22,113						
Chinook, salted	35,524	1,421						
Silver, fresh	88,811	1,332						
Silver, salted	2,140	86						
Blueback, or sock-eye, fresh	177,614	2,664						
Blueback, or sock-eye, salted	4,280	171						
Steelhead, fresh	35,523	1,066						
Steelhead, salted	856	34						
Sardines	2,000	60						
Sea bass, fresh			10,800	298	55,156	1,655	150,000	4,500
Sea bass, salted							5,140	216
Sea trout			58,000	1,740				
Smelt	65,000	1,950	17,575	527	49,505	1,980	20,000	600
Spanish mackerel			18,000	405				
Striped bass					22,224	889		
Yellow-fin			4,000	100				
Yellow-tail, fresh			2,670	53			5,000	150
Total	1,895,939	31,047	1,038,340	24,051	143,073	4,848	450,123	13,465
TRAMMEL NETS.								
Barracuda			137,490	2,437				
Bonito			16,668	250				
Flounders			679,799	16,453				
Jewfish, fresh			2,530	10				
Kingfish			5,546	83				
Perch					18,490	739		
Pompano			500	60				
Sea bass			55,282	1,639	15,761	473		
Total			897,815	20,932	34,251	1,212		
SHRIMP NETS.								
Shrimp meat					102,000	12,240		
Shrimp in shell					240,000	14,400		
Shrimp shells					400,000	1,640		
Total					742,000	28,280		
HOOP NETS AND POTS.								
Crabs	485,760	9,334			408,000	12,750		
Spiny lobsters			17,002	688				
Total	485,760	9,334	17,002	688	408,000	12,750		
LINES, HAND AND TRAWL.								
Albacore, fresh			25,838	517				
Barracuda, fresh			60,450	1,561				
Bonito			12,500	250				
Chub mackerel			44,582	959				
Cultus cod	10,000	300	4,700	141				
Flounders, fresh	86,000	2,550	113,966	3,674			10,000	300
Flounders, salted							12,420	621
Jewfish, fresh			7,590	41				
Perch	4,000	80						
Pompano			2,700	306				
Rockfish, fresh	40,000	1,200	513,503	15,519	31,789	1,272	100,000	3,000
Rockfish, salted							11,972	479
Salmon:								
Chinook							531,110	15,935
Silver							132,790	3,485

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	Humboldt.		Los Angeles.		Marin.		Monterey.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
LINES, HAND AND TRAWL—continued.								
Sculpin			2,670	$53				
Sea bass			9,000	315				
Sea trout			6,200	248				
Spanish mackerel, fresh			43,160	1,019				
Whitefish			19,470	570				
Yellow-tail, fresh			56,875	1,003				
Total	140,000	$4,130	923,204	26,176	31,789	$1,272	798,292	$23,820
TONGS, RAKES, FORKS, HOES, ETC.								
Clams, hard	6,896	1,227	35,688	2,896	51,408	6,141	1,920	182
Clams, soft	1,780	250	620	87				
Mussels							3,215	64
Sea urchins							3,719	521
Algæ							40,410	1,416
Total	8,676	1,477	36,308	2,983	51,408	6,141	49,264	2,183
ABALONE OUTFIT.								
Abalone, alive			182,000	1,274			540,000	5,400
Abalone meat			14,518	1,016				
Pearls								1,500
Total			196,518	2,290			540,000	6,900
Grand total	3,525,092	62,413	3,347,145	85,152	1,497,845	57,668	2,574,939	62,684

Apparatus and species.	Orange.		Sacramento.		San Diego.		San Francisco.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Carp			6,000	$120				
Catfish			88,700	2,218				
Croaker	33,700	$843			60,000	$1,500		
Flounders	4,400	125					19,200	$288
Mullet	6,000	180			2,000	60		
Perch	5,200	150			5,000	125	20,000	800
Pompano	800	80			1,000	100		
Sacramento perch			3,220	129				
Sardines							210,000	3,150
Shad			9,000	270				
Smelt	79,225	2,377			5,000	150	72,000	2,880
Striped bass			15,242	919			12,000	960
Surf-fish	33,100	993			17,000	510	21,600	1,728
Yellow-fin	7,000	140						
Total	169,425	4,888	122,162	3,656	90,000	2,445	354,800	9,806
GILL NETS.								
Barracuda, fresh	25,000	625			20,716	414		
Barracuda, salted					2,043	73		
Bonito	7,000	140						
Chub mackerel	6,000	180						
Croaker					6,960	278		
Herring					6,910	138	1,314,000	14,400
Kingfish					3,382	68		
Mullet					3,452	138		
Perch					3,452	69		
Salmon, chinook, fresh			516,823	26,289				
Sardines					6,820	136		
Sea bass, fresh	6,000	180			41,431	1,036	70,000	2,100
Sea trout					13,810	552		
Shad			25,900	777			76,800	3,072
Smelt					7,905	237	750,000	30,000
Spanish mackerel	2,500	75						
Striped bass			56,200	1,348			702,000	56,150
Yellow-tail, fresh					2,071	31		
Yellow-tail, salted					871	34		
Spiny lobsters					7,000	315		
Total	46,500	1,200	598,923	28,414	126,823	3,519	2,942,800	105,722

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	Orange.		Sacramento.		San Diego.		San Francisco.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
TRAMMEL NETS.								
Flounders	83,125	$2,078			320,199	$8,005	1,995,000	$29,925
Jewfish, fresh					2,762	28		
Jewfish, salted					338	10		
Salmon, chinook							84,000	3,360
Sea bass					27,622	691		
Shad							32,800	1,312
Spanish mackerel, fresh	2,000	60			2,485	50		
Spanish mackerel, salted					951	37		
Yellow-tail					2,271	45		
Total	85,125	2,138			356,628	8,866	2,111,800	34,597
FYKE NETS.								
Catfish			233,000	$5,840				
Sacramento perch			3,123	125				
Total			236,123	5,965				
PARANZELLA NETS.								
Flounders							43,200	648
Tomcod							14,400	576
Crabs							129,600	4,320
Total							187,200	5,544
SHRIMP NETS.								
Shrimp meat							36,000	4,320
Shrimp shells							150,000	750
Total							186,000	5,070
HOOP NETS AND POTS.								
Crabs							3,889,200	121,735
Spiney lobsters	67,067	2,682			146,786	6,562		
Total	67,067	2,682			146,786	6,562	3,889,200	121,735
LINES, HAND AND TRAWL.								
Albacore, fresh					41,431	414		
Albacore, salted					38,328	1,2 7		
Barracuda, fresh					403,602	8,097		
Barracuda, salted					209,710	7,328		
Black bass			2,000	160				
Bonito	8,000	160						
Catfish			40,223	1,006				
Chub mackerel	2,000	60			500	15		
Cultus cod							111,600	3,348
Flounders, fresh	13,875	357			58,526	1,263		
Jewfish, fresh					24,859	373		
Jewfish, salted					7,732	251		
Kingfish					3,523	70		
Rockfish, fresh	48,000	1,440			261,029	5,520	376,800	18,840
Rockfish, salted					10,771	343		
Sea bass	4,000	120						
Sole					10,357	207	36,000	1,440
Spanish mackerel, fresh	3,500	105			80,378	1,608		
Spanish mackerel, salted					92,451	3,033		
White-fish	6,000	180			27,621	552		
Yellow-tail, fresh	25,000	500			74,982	1,165		
Yellow-tail, salted					83,600	2,996		
Other fish					13,610	136		
Total	110,375	2,922	42,223	1,166	1,443,010	34,581	521,400	23,628
TONGS, RAKES, FORKS, HOES, ETC.								
Clams, soft							25,710	3,750
Oysters, eastern							970,669	514,399
Oysters, native							300,524	91,770
Terrapin			2,000	162				
Turtles					2,595	104		
Total			2,000	162	2,595	104	1,296,903	609,919
Grand total	478,492	13,830	1,001,431	39,363	2,165,842	56,077	11,493,103	916,021

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	San Joaquin.		San Mateo.		Santa Barbara.		Santa Cruz.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Barracuda							15,000	$450
Carp	30,000	$600						
Catfish	45,321	2,146						
Chub mackerel							15,000	450
Hardheads	8,000	320						
Kingfish							1,000	30
Perch							3,000	90
Pompano							4,900	780
Sacramento pike	3,500	140						
Sardines							17,000	170
Sea bass							5,000	100
Smelt							5,000	150
Striped bass	58,000	2,400						
Total	144,821	5,606					65,900	2,220
GILL NETS.								
Barracuda, fresh					43,611	$1,578	64,500	1,255
Bonito							85,250	853
Chub mackerel							24,100	883
Flounders, fresh					5,000	200		
Jewfish					2,000	60		
Perch							4,150	165
Pompano							5,950	1,265
Salmon, chinook, fresh	90,000	4,500					16,781	965
Sardines							28,750	575
Sea bass, fresh					39,000	1,520	314,973	10,479
Shad	78,000	2,340						
Smelt	8,000	320			1,313	66	83,037	3,654
Spanish mackerel					7,000	280		
Striped bass	15,000	600						
Yellow-tail, fresh					4,000	120	1,725	35
Total	191,000	7,760			101,924	3,824	629,216	20,129
TRAMMEL NETS.								
Albacore					8,000	240		
Bonito					3,000	90		
Chub mackerel					500	20		
Cultus cod							28,563	781
Flounders					36,000	960	12,625	253
Jewfish, fresh					1,000	30		
Perch					2,000	60	25,800	645
Sea bass					7,000	280		
Sole							32,062	941
Yellow-tail					2,000	60		
Total					59,500	1,740	99,050	2,620
FYKE NETS.								
Carp	30,000	600						
Catfish	79,000	3,500						
Hardheads	30,000	1,200						
Sacramento pike	6,000	240						
Total	145,000	5,540						
PARANZELLA NETS.								
Flounders							2,875	57
Kingfish							288	9
Sole							9,688	294
Total							12,851	360
SHRIMP NETS.								
Shrimp meat			24,000	$2,880				
Shrimp shells			100,000	500				
Total			124,000	3,380				
HOOP NETS AND POTS.								
Spiny lobsters					650,346	25,414		

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	San Joaquin.		San Mateo.		Santa Barbara.		Santa Cruz.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
LINES, HAND AND TRAWL.								
Barracuda, fresh					2,000	$80	3,000	$45
Catfish	22,500	$1,020						
Cultus cod							10,188	294
Flounders, fresh					9,000	220		
Kingfish					1,000	30	863	17
Rockfish, fresh					23,000	690	131,250	4,108
Salmon, chinook							138,468	7,677
Smelt							2,600	78
Spanish mackerel, fresh					3,000	120		
Surf-fish					1,000	30		
Whitefish					7,000	210		
Yellow-tail, fresh					3,000	90		
Other fish					5,000	150		
Total	22,500	1,020			54,000	1,620	286,369	12,219
TONGS, RAKES, FORKS, HOES, ETC.								
Clams, soft			17,140	$2,500				
Terrapin	23,500	2,350						
Algæ					18,910	851		
Total	23,500	2,350	17,140	2,500	18,910	851		
ABALONE OUTFIT.								
Abalone, alive			75,000	525				
Abalone meat					13,430	940		
Abalone shells					8,730	218		
Total			75,000	525	22,160	1,158		
Grand total	526,821	22,276	216,140	6,405	906,840	34,607	1,093,386	37,548

Apparatus and species.	Shasta.		Solano.		Sutter.		Tehama.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.								
Black bass					3,000	$240		
Sacramento perch					1,000	40		
Salmon:								
Chinook, fresh	50,000	$2,500	1,411,902	$63,109	90,000	4,500	172,079	$6,883
Chinook, salted			1,995,010	82,679				
Shad			6,651	175			4,000	120
Striped bass			94,880	3,795				
Total	50,000	2,500	3,508,443	149,758	94,000	4,780	176,079	7,003
FYKE NETS.								
Catfish					50,000	1,500		
Hardheads					4,000	160		
Total					54,000	1,660		
LINES, HAND AND TRAWL.								
Catfish			1,400	42				
Grand total	50,000	2,500	3,509,843	149,800	148,000	6,440	176,079	7,003

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	Ventura.		Yolo.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.						
Barracuda					15,000	$450
Black bass			1,500	$120	10,500	1,200
Bonito					4,166	63
Carp			4,000	80	40,000	800
Catfish			37,100	742	189,121	5,646
Chub mackerel					15,000	450
Croaker	5,000	$125			114,380	2,867
Flounders	13,500	345			77,100	1,758
Hardheads			4,000	160	31,000	860
Herring					49,344	821
Kingfish	7,000	140			11,320	236
Mullet	1,500	45			9,500	285
Perch	5,000	125			133,380	4,602
Pompano	4,000	480			16,900	2,040
Rockfish					500	15
Sacramento perch			2,500	200	5,720	329
Sacramento pike					3,500	140
Salmon:						
Chinook, fresh					737,095	11,056
Chinook, salted					17,762	710
Silver, fresh					44,405	666
Silver, salted					1,070	43
Blueback, or sock-eye, fresh					88,806	1,332
Blueback, or sock-eye, salted					2,140	86
Steelhead, fresh					17,761	533
Steelhead, salted					428	17
Sardines					677,000	7,820
Sea bass					5,900	127
Shad			5,000	150	14,000	420
Smelt	25,000	750			357,507	12,694
Spanish mackerel					1,000	30
Striped bass			20,000	1,600	265,986	12,669
Surf-fish	4,000	120			118,060	4,622
Yellow-fin					11,000	240
Yellow-tail	1,000	25			1,500	35
Other fish	500	15			500	15
Squid, salted					251,360	10,054
Total	66,500	2,170	74,100	3,052	3,339,711	85,731
GILL NETS.						
Barracuda, fresh					1,188,567	28,338
Barracuda, salted					6,413	292
Black bass					3,000	240
Bonito	1,200	24			122,616	1,329
Carp					374	7
Chub mackerel					61,350	1,888
Croaker					6,960	278
Flounders, fresh	15,000	375			40,000	1,175
Flounders, salted					11,413	570
Herring					1,377,098	15,012
Jewfish	500	10			2,500	70
Kingfish					45,021	1,068
Mullet					3,452	138
Perch					25,602	734
Pompano					8,450	1,490
Rockfish	400	14			400	14
Rockfish, salted					4,200	210
Sacramento perch					1,000	40
Salmon:						
Chinook, fresh			144,000	6,480	7,085,610	270,944
Chinook, salted					3,152,034	134,468
Silver, fresh					88,811	1,332
Silver, salted					2,140	86
Blueback, or sock-eye, fresh					177,614	2,664
Blueback, or sock-eye, salted					4,280	171
Steelhead, fresh					35,523	1,066
Steelhead, salted					856	34
Sardines					37,570	771
Sea bass, fresh	7,000	245			695,819	22,057
Sea bass, salted					5,140	216
Sea trout					71,810	2,292
Shad					280,572	8,228
Smelt					1,002,335	39,334
Spanish mackerel					27,500	760
Striped bass					1,304,418	79,447
Yellow-fin					4,000	100

STATEMENT, BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	Ventura.		Yolo.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS—continued.						
Yellow-tail, fresh					15,466	$389
Yellow-tail, salted					871	34
Spiny lobsters					7,000	315
Total	24,100	$668	144,000	$6,480	16,907,785	617,601
TRAMMEL NETS.						
Albacore					8,000	240
Barracuda	500	13			137,990	2,450
Bonito	2,500	50			22,168	390
Chub mackerel	500	10			1,000	30
Cultus cod					28,563	781
Flounders	14,500	363			3,141,248	58,037
Jewfish, fresh	1,000	20			7,292	88
Jewfish, salted					338	10
Kingfish					5,546	83
Perch					46,290	1,444
Pompano					500	60
Rockfish	1,900	61			1,900	61
Salmon, chinook					84,000	3,360
Sea bass	8,000	280			113,665	3,363
Shad					32,800	1,312
Sole					32,062	941
Spanish mackerel, fresh	500	13			4,985	123
Spanish mackerel, salted					951	37
Yellow-tail	500	10			4,771	115
Total	29,900	820			3,674,069	72,925
FYKE NETS.						
Carp					30,000	600
Catfish			106,000	2,120	468,000	12,960
Hardheads					34,000	1,360
Sacramento perch					3,123	125
Sacramento pike					6,000	240
Total			106,000	2,120	541,123	15,285
PARANZELLA NETS.						
Flounders					46,075	705
Kingfish					288	9
Sole					9,688	294
Tomcod					14,400	576
Crabs					129,600	4,320
Total					200,051	5,904
SHRIMP NETS.						
Shrimp meat					242,000	29,040
Shrimp in shell					640,000	38,400
Shrimp shells					950,000	4,390
Total					1,832,000	71,830
HOOP NETS AND POTS.						
Crabs					4,782,960	143,819
Spiny lobsters	137,314	5,493			1,018,515	40,839
Total	137,314	5,493			5,801,475	184,658
LINES, HAND AND TRAWL.						
Albacore, fresh					67,269	931
Albacore, salted					38,328	1,207
Barracuda, fresh					469,052	9,783
Barracuda, salted					209,710	7,328
Black bass					2,000	160
Bonito	4,500	90			25,000	500
Catfish			15,900	318	80,023	2,386
Chub mackerel					47,082	1,034
Cultus cod					136,488	4,083
Flounders, fresh	61,800	1,549			353,167	9,913
Flounders, salted					12,420	621
Jewfish, fresh	500	10			32,949	424
Jewfish, salted					7,732	254

STATEMENT BY COUNTIES, SPECIES, AND APPARATUS, OF THE YIELD OF THE SHORE FISHERIES OF CALIFORNIA IN 1904—Continued.

Apparatus and species.	Ventura.		Yolo.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
LINES, HAND AND TRAWL—continued.						
Kingfish					5,386	$117
Perch					4,000	80
Pompano					2,700	306
Rockfish, fresh	28,200	$860			1,553,571	52,449
Rockfish, salted					22,743	822
Sacramento perch			1,500	$60	1,500	60
Salmon:						
Chinook					669,578	23,612
Silver					132,790	3,485
Sculpin					2,670	53
Sea bass					13,000	435
Sea trout					6,200	248
Smelt					2,600	78
Sole					46,357	1,647
Spanish mackerel, fresh					130,038	2,852
Spanish mackerel, salted					92,451	3,033
Surf-fish					1,000	30
Whitefish					60,091	1,512
Yellow-tail, fresh	1,500	30			161,357	2,788
Yellow-tail, salted					83,600	2,996
Other fish					18,610	286
Total	96,500	2,539	17,400	378	4,491,462	135,513
TONGS, RAKES, FORKS, HOES, ETC.						
Clams, hard	528	120			96,440	10,566
Clams, soft					139,690	18,334
Oysters, eastern					1,019,767	536,253
Oysters, native					300,524	91,770
Mussels					28,215	1,764
Terrapin					25,500	2,512
Turtles					2,595	104
Sea urchins					3,719	521
Algæ					59,320	2,267
Total	528	120			1,675,770	664,091
ABALONE OUTFIT.						
Abalone, alive					797,000	7,199
Abalone meat					27,948	1,956
Abalone shells					8,730	218
Pearls						1,500
Total					833,678	10,873
Grand total	354,842	11,810	341,500	12,030	39,297,124	1,864,411

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SURVEY OF OYSTER BOTTOMS IN MATAGORDA BAY, TEXAS

By H. F. Moore,
Assistant, Bureau of Fisheries.

Bureau of Fisheries Document No. 610.

PREFACE.

On February 13, 1904, Hon. A. S. Burleson, Representative in Congress from Texas, addressed to the Bureau of Fisheries a request that a survey of the oyster regions of that state be made for the purpose of determining their extent, condition, and the possibilities of their development and improvement. It being impossible with the Bureau's limited equipment and personnel to undertake a comprehensive examination of the extensive oyster-producing waters of the entire Texas coast, a work which would require several years, suggestion was made on February 15 that a specific locality be indicated and "that the proper state authorities make a formal request for this survey in order that the Bureau may know officially that the proposed work is agreeable to and desired by the state." Pursuant to this suggestion Hon. S. W. T. Lanham, governor of Texas, on March 14 made formal application for the survey, and in a letter dated May 14, in reply to a request of the Bureau, submitted correspondence definitely indicating Matagorda Bay as the most desirable region for the investigation. The steamer *Fish Hawk* was detailed to the work, with the requisite civilian assistants in addition to her naval personnel, and the direction of the survey was assigned to Dr. H. F. Moore, scientific assistant in the Bureau of Fisheries. It was the original intention to dispatch the *Fish Hawk* in season to take up the work early in September, 1904, but delays incident to the making of necessary repairs caused unexpected detention and the vessel did not reach the scene of her labors until December 14. The work continued until May 14, 1905, according to the plans and with the results detailed in the following pages.

GEORGE M. BOWERS,
Commissioner.

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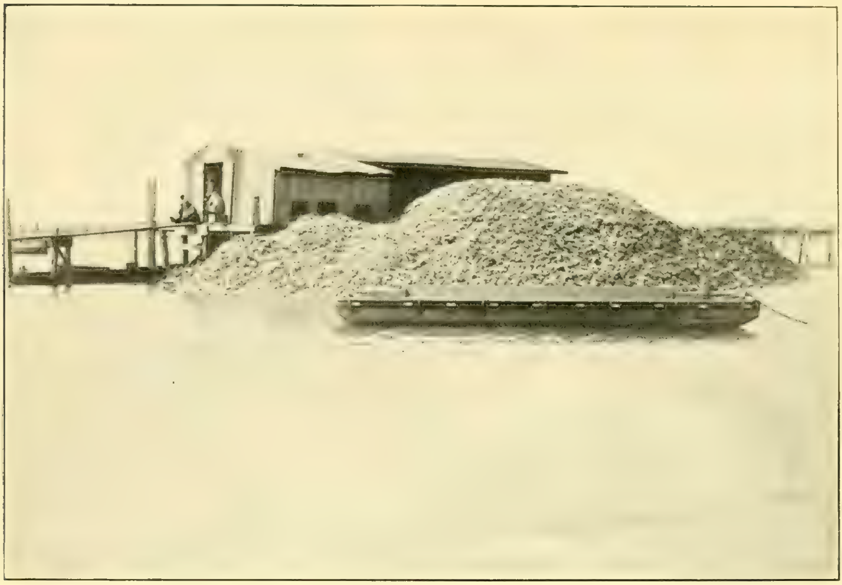


SHUCKING HOUSES, SHOWING SHELLS AVAILABLE FOR OYSTER CULTURE.

SURVEY OF OYSTER BOTTOMS IN MATAGORDA BAY, TEXAS.

By H. F. Moore,
Assistant, Bureau of Fisheries.

OBJECT AND METHODS OF THE SURVEY.

As stated in the general instructions governing the party, the survey had for its object "the accurate location and charting of all oyster beds, scattering growths of oysters, and areas of bottom suitable for oyster culture, or which can be made suitable, and also an investigation of the biological, physical, and statistical features relative to the oysters and oyster fisheries of the region." The entire bay was embraced in the original scheme of the survey, but the work was much retarded by the inclemency of the weather during the winter, and it was found impracticable in the time available for the purpose to cover more than the region lying above Half Moon Reef. This region, however, is by far the most important part of the bay from the standpoint of the oystermen, and during the season of 1904–5 it yielded practically the entire product used in the oyster houses.

The work was thoroughly done, and the location of oysters and soundings can be vouched for. It was practically a hydrographic survey, on which were superimposed the special investigations pertaining particularly to oysters. Projections showing the location of triangulation points used in former hydrographic and topographic surveys of the bay were obtained from the Coast and Geodetic Survey, together with descriptions of the permanent marks. Three of these triangulation points (Sevenmile, North Base, and West Point) were recovered and used in the location of the signals erected at convenient intervals on the shore, and three others (South Base, Duncan, and East Point) were recovered, but not occupied. The shore lines, which in places differed considerably from the delineations of the projections and charts, were located from three-point sextant observations at intervals of 500 to 600 yards, the intervening portions being sketched in by the observers. In general the bay has encroached upon the land between 100 and 500 yards from the shore line shown on the projections furnished by the Coast Survey. The lines of soundings consisted of a parallel series running at approximately right angles to the long axis of the bay, connected with the shore by a system of zigzags and traversed where circumstances demanded by lines running in the required directions. All the larger

and more important beds were developed by stations taken at intervals of about 200 yards around their margins, which gives considerable accuracy of delineation. In the cases of most of the smaller or scattering beds, however, this was considered unnecessary, and the actual shape and area of these may therefore vary slightly from that shown on the chart. The error in any case is not material.

The lines of the primary series of soundings were made from launches running at a speed of 4 miles per hour, soundings being recorded at fifteen-second intervals, and the position of the boat being fixed every five minutes by three-point sextant observations. The individual recorded soundings were therefore about 30 yards apart, and the positions of the boat were fixed at 600-yard intervals. The lines were run on ranges or on courses and bearings, flags erected on shore or in the bay being used as marks to insure accuracy of direction. In that part of the bay above Kains Landing, where small beds and scattered growths are numerous and not all well known to the oystermen, the lines were 300 yards apart, but below there they were gradually opened out until in the region between Dog Island Reef and Half Moon Reef, where the beds are few, large, and conspicuous, they were run at intervals of 800 yards. The sounding pole devised by Lieutenant Swift for his work in Apalachicola Bay [a] was used continuously while the boats were under way, and in addition a chain was dragged from the launch so as to give a practically continuous report of the character of the bottom and the presence or absence of oysters. The chain was rigged from the bow of the launch on a small boom so as to keep it clear of the propeller, a lanyard running inboard to the helmsman, who instantly felt the surge of the apparatus as it came in contact with oysters or shells, and reported the occurrence at once to the recorder.

The zigzag lines in the shoal water inshore were run from a flatboat, the methods of sounding being practically the same as those used on the launches. The nature of the bottom in general was observed by means of the sounding rod, supplemented at intervals by probings with an iron rod to determine the character of the substratum. The examinations of the oysters were carried on independently of the soundings, thus saving the sounding party the annoying interruptions commonly experienced in work of this character. The plan adopted was a distinct gain in speed and accuracy. When the sounding pole or chain indicated a bed of any importance, the officer in charge of the sounding party, usually without stopping the boat, erected a flag flying the number of the nearest sextant station, noting the exact time in the sounding book. From these data

[a] Report of a survey of the oyster regions of St. Vincent Sound, Apalachicola Bay, and St. George Sound, Florida, by Franklin Swift. Rept. U. S. Fish Com. 1896 (1897), p. 191.

it was possible to plot the position within a few yards. The biologist, following in a small boat, occupied these flag stations, systematically selecting at each, from soundings, a characteristic area. Four steel-shod pikes were thrust into the bottom, marking out an area 5 yards long and 1 yard wide, and everything on the bottom—oysters, shells, and débris—was carefully tonged and examined. At each such station the following data were taken: The number of oysters under 1 inch in length, between 1 and 3 inches, and over 3 inches, respectively; the number or quantity of dead shells; the shape, quality, and general condition of the oysters; and the species of other animals and plants found. An examination of the entire bed was then made in order to ascertain its general character, shape, and approximate area, and the bottom was probed with steel-shod lengths of iron pipe in order to ascertain the nature and depth of the substratum. On the smaller beds one or two such examinations were sufficient, but on the larger and more important ones a number of stations were occupied. Full notes were made, and the result is a complete and accurate record of the character of each bed at the time of the survey in a form to be readily available for comparison with future surveys, thus making possible a history of the beds showing the effects of the fisheries and of the physical and biological vicissitudes to which they may be in future subjected.

The observations on the density and temperature of the water were made by the sounding party at intervals of about 1 mile, in each case the position of the boat being fixed by sextant observations. The water was collected at a uniform distance of 14 inches above the bottom by means of a stoppered bottle lashed to a pole, the cork being withdrawn by a cord while the bottle rested on the bottom. A specimen of the water from each station was retained for examination as to food value, while the density and temperature were noted at once and entered in the sounding book. During the entire term of the survey a series of tridaily observations of the density and temperature of the water were made at the anchorage of the *Fish Hawk*. These are useful for purposes of comparison and by illustrating the rapid fluctuations due to meteorological conditions.

The tide gauge was established at Matagorda, a geographically central location, where observations were continued from January 20 to May 11, inclusive. A description of the tide gauge, bench mark, and the plane of reference adopted will be given in the chapter treating of the tides.

Upon arrival in Matagorda Bay, December 12, the *Fish Hawk* anchored off Palacios, but soon after she was moved up to an anchorage about 4 miles below Dog Island Reef. Here she remained until a few days before the conclusion of the survey, when she dropped farther down the bay. As the upper part of the bay is much too shoal

for the *Fish Hawk's* draft, it was necessary to obtain another vessel for transporting the materials and to serve as quarters for the field party. For several weeks a local schooner was employed; but she was ill-adapted to house the party during the cold weather, and the three-masted schooner *Mathilda* was chartered and used until the survey reached Dog Island Reef, after which the work was carried on entirely from the *Fish Hawk.*

Until February 26 the party was engaged in erecting and cutting in signals. On that date the work of the survey proper was begun, first from the *Mathilda* alone, but about a week later with the assistance of a party from the *Fish Hawk.* There were assigned to the *Mathilda* a mate and five men from the *Fish Hawk*, and a civilian staff consisting of two observers and a biologist. This party carried on all of the offshore soundings and the shore work throughout the survey, and it is a pleasure to recall the zeal with which they fulfilled their duties and the good nature with which they faced the many discomforts. There was much cold and boisterous weather, northers were frequent, and the work was continued many days when it seemed that the launch could barely live in the seas. The launch party consisted of helmsman, two observers, pole man, recorder, and machinist. The helmsman, besides being responsible for the course of the launch, kept his hand on the sounding chain and reported the presence of oysters. In addition to the sextant work, one of the observers had general charge of the boat and the planting of flags, and the other attended to the density and temperature observations and the collection of water specimens for biological analysis. The recorder marked the time and recorded all observations except the angles, which were kept by the observer in charge and duly entered in the sounding book each night. The pole man sounded continuously, and the results were recorded at 15-second intervals. Owing to the fact that the launch and all its contents were usually drenched with spray, as well as to the lack of room, no boat sheet was carried, but each day the work of the day preceding was platted and brought up to date. The use of flags and ranges insured the rectification of the lines.

The party from the *Fish Hawk* was given the task of delimiting the large reefs from Dog Island to Half Moon, inclusive. The results of their work appear on the chart accompanying this report.

DESCRIPTION OF MATAGORDA BAY.

LOCATION.

Matagorda Bay is about midway of the Texas coast, rather nearer the eastern than the western limits of the state. As is characteristic in general of the sounds of this coast, the greatest length of the bay

lies in the direction of the coastal trend, and its waters are separated from those of the gulf merely by a narrow sandy peninsula, which the erosion of storms periodically converts into an island. Pass Cavallo, the entrance to the bay, about 125 miles southwest of Galveston, lies at the extreme southwestern corner, and carries in its channel a depth of about 10½ feet at extreme low water. At the time of the survey this was the only direct communication between the waters of the bay and the gulf, but prior to the summer of 1904, when it finally closed, Mitchells Cut, an opening of widely fluctuating depth and width, admitted salt water to the extreme upper part of the bay, and in the spring of 1905 an effort was being made, in the interest of the oyster industry, to open a channel to salt water from the head of Browns Bayou. From Pass Cavallo to the head of the bay is a distance of about 50 miles, and from the pass to Sand Point, at the mouth of Lavaca Bay, is about 13 miles.

AREA AND SHORE LINE.

The southwestern part of Matagorda Bay is about 12 miles wide, but at Palacios Point it abruptly narrows to about 4½ miles, with an average slightly less than this as far as Dressing Point, where there is another abrupt contraction to about 1½ miles thence to the head of the bay. The total area, exclusive of Lavaca, Karankaway, and Tres Palacios bays, which are contiguous to the wide southwestern part, is about 310 square miles, the area covered by the survey above the point of Half Moon Reef approximating about 140 square miles. The northwestern or prairie shore is almost unbroken, save at the mouths of the Colorado River and several creeks, but the peninsula littoral is extremely irregular, with numerous muddy bayous, which, especially below Dog Island Reef, in many cases head at the foot of the sand dunes which skirt the outer coast.

AFFLUENTS.

The principal fresh-water affluent is the Colorado River, which rises on the borders of the Staked Plains and, draining a large basin along its course of from 700 to 800 miles, discharges above Dog Island, about 2 miles west of Matagorda. A considerable, if not the preponderating, flow now passes through Buffalo Bayou, close to the town, and the river's western mouth, shown on previous surveys, has become obliterated by the deposit of silt. Mad Island, Little Boggy, Big Boggy, Live Oak, and Caney creeks also at times carry considerable volumes of fresh water, the last-named stream entering the extreme head of the bay through an artificial channel. It appears to have entirely lost its original direct connection with the gulf.

DEPTH AND CHARACTER OF BOTTOM.

The floor of the bay is practically level save where broken by the abrupt rising of an old reef or oyster lump above the surrounding bottom. In the area surveyed there is a gradual increase of water from the flats at the head of the bay to a depth of about 5 feet near Dog Island Reef, while below Dog Island the depth ranges from about 4 feet close to the reef to 14 feet, the deepest water in the entire bay, abreast of Half Moon light. Throughout the length of the area surveyed the deepest water in general lies nearer the peninsula than the prairie shore.

Between Matagorda and Dog Island, across the existing and the former mouths of the Colorado River, there is now a muddy flat covered with snags, to which the freshets of the Colorado make yearly accretions.

CHANNELS.

With the exception of Mad Island Reef, all the great oyster beds lying below the mouth of the Colorado River are traversed by one or more channels used by the oystermen.

Palacios Point channel lies just on the edge of the oysters, between Half Moon Reef and Palacios Point. It is rather broad, and carries a depth of about 3 feet at low winter tide. It has been eroded since the preparation of the Coast Survey chart of the region.

Mad Island channel, near the inner end of Shell Island Reef, is narrow and holds about 1½ feet of water at low tide.

Shell Island channel lies immediately northwest of Shell Island, and has a serviceable width of about 20 feet and a low-water depth of 2½ feet.

Dog Island channel, formerly called Steves channel, is an artificial cut southeast of Dog Island. It has a low-water depth of about 2 feet at its western and 2½ feet at its eastern end, with much deeper water between. The currents in this channel often run with great velocity, and sometimes for several days in one direction, under the influence of prevailing winds.

Middle channel lies near the middle of Dog Island Reef. It was cut artificially about 1847, and reexcavated a decade or so later, but is now seldom used. It carries a depth not exceeding 1¼ feet at the low-water plane of reference adopted in this report.

Tiger Island channel is at the southeastern end of Dog Island Reef. It is narrower and more tortuous than Dog Island channel, and the currents run through it with greater velocity. It has a depth of not more than 1½ feet at winter low water.

Dressing Point channel lies on the edge of the oyster beds between Dressing Point shoal and the point of Dressing Island, and has a

low-water depth of 3 feet. Dressing Island was a peninsula at the time the Coast Survey topographic work was performed, but a channel carrying 1½ feet into Live Oak Bay has since been eroded through its neck.

Browns Cut is an uncompleted canal dug in the spring of 1905 from the head of Browns Bayou nearly to the gulf shore. It is the intention of the projectors to continue this upon favorable opportunity, so as to admit salt water to the head of the bay. Owing to the shifting character of the sands on the gulf coast it is doubtful, however, whether this channel can be maintained without constant work, as the tendency of the currents will be to pile up a sand bar at its inner end, which by checking the currents will probably eventually result in the silting up of the cut.

THE OYSTER BEDS.

DENSITY OF OYSTER GROWTH.

The oyster beds of Matagorda Bay above Half Moon light-house as developed by this survey comprise a total area of 3,111 acres, exclusive of shores and bayous. It must not be assumed, however, that this area is all oyster-bearing, for many of the scattering and very scattering beds consist of an aggregation of small patches separated by more or less extensive areas of barren bottom. In the region above Dressing Point, for instance, it is quite possible to find stretches of barren bottom within the limits of charted beds, but further investigation would show such barren bottom to be surrounded by more or less productive areas.

Only the general extent of the beds is indicated on the accompanying chart, and no attempt is made to show the position or the extent of the individual patches. Even were it practicable to find and locate with instruments each of these, it would be quite impossible as well as useless to plat and exhibit them on the chart. The chart is intended to show that over the broad area represented oysters will be found in an average density of growth indicated by the symbols adopted, but they may be dense in one place, scattering in another, and totally absent in a third. Three symbols are employed, showing (1) very scattering growth, averaging less than 25 barrels per acre; (2) scattering growth, averaging between 25 and 100 barrels per acre, and (3) dense growth, indicating anything of an average productiveness of over 100 barrels per acre. These symbols apply solely to oysters 3 inches or more in length, this arbitrary standard having beeen selected as a minimum size of marketable oyster. Practically, however, many of these small oysters, owing to their inferior shape, are economically worthless until they have attained further growth.

The absence or presence, both relatively and actually, of oysters under 3 inches long is entirely disregarded in estimating the density of the beds, and it may therefore happen that an abundant growth of young may be shown on the chart as a scattering or very scattering area of adults. Such cases may be detected, however, by consulting the text description of the bed in question, or by reference to the following table, which shows the numbers per square yard of oysters of each of three sizes as determined from actual observations and counts on the several beds.

This table shows also the area in acres of the bed as platted on the chart, the proportion of such area estimated to actually bear oysters of the indicated density, and the estimated total contents in barrels of marketable (3-inch) oysters on each bed. For the latter only an approximate accuracy is claimed, the factors entering into it being somewhat difficult to determine; the size, shape, and character of the oysters, their density, the shape and size of the clusters, together with irregularities in distribution, have to be taken into consideration. The estimates in all cases are believed to be conservative, rather under than over the productiveness of the beds. For the purpose of this report and specifically in the following table, a barrel of oysters is considered to contain 2 bushels.

DENSITY OF OYSTER GROWTH ON CHARTED AREAS.

Name of bed.	Observed number of oysters per square yard.			Area in acres.	Estimated per cent of area actually bearing oysters.	Estimated contents in barrels of oysters over 3 in. long.
	Over 3 inches.	3 inches to 1 inch.	Under 1 inch.			
Above Dressing Point	14	8	....	395	15	5,000
Live Oak Bay	13	8	1	228	30	5,250
Dressing Point Shoals	15	26	4	477	40	26,000
Creek Patches	4	3	1	90	75	1,000
Eleven-mile Lumps[a]	50	....	....	13	80	4,700
East Point Bed	48	10	....	23	30	6,400
Middle Patches	135	63	15	10	60	12,000
Idlebach Flats	9	2	....	37	20	1,000
Grass Lump	55	51	10	2	100	1,000
Boggy Lump	182	52	29	5	100	11,000
Middle Lump	163	176	34	12	90	8,500
Raymond Landing Shoals	90	112	147	80	90	45,000
Boiler Bayou Reef	67	60	41	36	100	25,000
Spring Bayou Reefs	84	47	51	32	100	30,000
Dog Island Reef:						
North end	6	33	16	113	80	2,200
East side	83	36	30	142	100	145,000
Near Tiger Island[b]	24	9	5	139	30	13,000
West side	32	21	9	538	30	18,000
Sherman Bank[a]	....	....	....	....	....	....
Snapper Bank[a]	....	....	....	....	....	....
Forked Bayou Reef	31	20	10	4	100	1,500
Shell Island Reef:						
East side	106	57	13	25	100	35,000
West side	28	51	16	120	60	7,500
Mad Island Reef:						
East side	42	24	4	23	100	9,000
West side	16	34	2	70	50	2,500
Half Moon Reef:						
North end[c]	1	....	....	56	100	1,000
East side	35	8	3	87	75	25,000
South end[c]	2	....	....	176	100	4,400
West side[a]	....	....	....	175	....	....
Total	....	....	....	3,108	....	445,900

[a] Not examined in detail. [b] Partially fished out. [c] Thoroughly fished out.

TYPES OF OYSTER BEDS.

These beds may be divided into three general types—(1) long reefs consisting of extensive long, narrow shell beds surmounted by oysters, running at right angles to the currents and with marked shoaling of the water over their crests; (2) short reefs and lumps consisting of small deep shell beds bearing oysters, with usually no great disparity between their long and short axes, and also marked by abruptly shoaling water; (3) flat beds and patches without extensive deposits of shells, over which the depth varies but slightly from that over the surrounding bottom.

LONG REEFS.

The long reefs are confined entirely to that portion of the bay lying below the mouth of the Colorado River, and judged by their size and structure they are undoubtedly the beds of greatest age. With the exception of Dog Island Reef, which forms a practically complete bulkhead, they all begin at or near the northwest shore and end in the deeper water toward the middle of the bay. Dog Island Reef probably originated in the same way, and its present condition is but a completed or more matured stage of development. The stiff, waxy, prairie loam which forms the inland shore is better adapted to the support of cultch than is the sand of the gulf side of the bay, which is more or less subject to shifting under the influence of the storms and winds which sweep over the sandy peninsula. Shells or other bodies lodging in the shallow water near the prairie shore are therefore preserved for a longer period in a condition favorable for the attachment of the minute floating fry of the oysters, and once established the infant bed tends to grow by yearly accretions. After the bed has become fairly established and begins to rear its crest above the bottom, the tendency is toward the preponderance of growth at its outer end, where the currents sweep most strongly and more perfectly clean the oysters and shells of all deposits of mud and silt which would operate to stifle the tiny spat.

It will be observed from an inspection of the chart that each of these reefs has its long axis at right angles to the set of the currents. Above Palacios Point the currents run generally in the direction of the length of the bay, and Mad Island, Shell Island, and Dog Island reefs therefore lie almost transversely to the parallel shore lines; but at Palacios Point the bay abruptly widens, the currents describe more or less of an arc with the point as the center, and Half Moon reef has grown along that radius to which the flow of greatest velocity is related as a tangent. In other words, the reefs have followed the usual law of development, growing most rapidly toward the strongest current and less rapidly along their sides, where the currents slacken

and eddy and where, therefore, the deposit of mud and silt more speedily engulfs the shells and renders them ill adapted to the attachment of spat.

In other characters, also, the long reefs present general features of resemblance to one another. Each has a crest or backbone, awash or nearly awash at low water, running from end to end. The margin of the bed facing up the bay is comparatively close to this crest, abrupt in its rise from the bottom and continuous in its contour, while the opposite margin is farther removed from the crest, merging more gradually with the adjacent barren bottom and broken up into long projecting ridges or spurs separated by narrow, muddy indentations and sloughs. In all of these reefs, also, the upper side is the only one resorted to by the oystermen, as there only are large oysters of good quality to be found in quantities sufficient to make remunerative tonging. On the lower sides of the reefs not only is the density of all sizes of oysters less, but among those that are found there is a preponderance of small ones, and all are inferior in fatness to those just across the crest.

At first thought it might seem that the proportionately large number of small oysters on the lower sides of these reefs was due to a more abundant set of spat, but this assumption is speedily invalidated by the fact that the total number of oysters there is undoubtedly less than on the opposite side, notwithstanding that none are removed by the oystermen. The evidence shows, therefore, that the set of spat is actually less than on the upper side, and the preponderance of small oysters is due solely to deficiency of growth. From these facts it is apparent that the conditions on the "up-the-bay" margins are superior as regards both the set of spat and the supply of food, but the exact nature of the difference is difficult to determine from actual observation. On theoretical grounds, however, it would appear to be dependent upon the set of the currents, for it is a general condition of oyster growth that, other things being equal, the set of spat, the rate of growth, and the production of fat are greatest in those parts of reefs where the water flows with greatest velocity. It can be assumed that in the presence of the great bodies of spawning oysters which these reefs furnish the distribution of swimming fry must be so general as to be practically uniform everywhere in their vicinity; that the food value of the water on the different sides of the reef is essentially uniform was determined by actual observations, as exhibited in the table (p. 73) incorporated in the section of this report treating specifically with that subject. As to the matter of currents, however, what are the actual conditions?

In the discussion of the currents of Matagorda Bay subsequently given in this report will be found the statement that the pre-

ponderating set is toward the mouth of the bay, a condition necessarily imposed by the discharge of fresh water from the several streams. If there were no tributary streams, the currents would be strictly conditioned by the ebb and flow of the tides, and, neglecting the small factors of evaporation and seepage, their volumes would be equal in the two directions; but the Colorado and its sister streams drain vast areas of the country, discharging a volume of water which relatively to the cross section of the bay is very considerable, and as essentially all of this water finds its way into the gulf through Pass Cavallo, the downward currents must consequently be stronger than those flowing toward the head of the bay. This gives the upper margins of the reefs a decided advantage in the matter of conditions favorable to spat fixation and the growing and fattening of the oysters, inasmuch as the cultch is kept cleaner and more food is carried within the reach of the oysters setting on it.

It also appears reasonable to invoke the current characteristics as an explanation of some of the physical peculiarities of the long reefs, especially that diversity which occurs between the two sides. The water of the Colorado River, which, especially in times of freshet, is heavily charged with mud, flows into the bay just above Dog Island Reef. As it spreads out after leaving the channel, its velocity is promptly checked and the coarser and heavier particles of sand and mud are deposited to produce a fan-shaped shoal surrounding the mouths of the river and Buffalo Bayou, while the finer particles remain in suspension. At high water, when the crest of the reef is covered, the outward flow of the bottom stratum of this water is largely checked by the barrier of Dog Island Reef and some part of the suspended matter is thrown down on the bottom close to the reef as silt, while over the crest there is flowing a current of sufficient velocity to keep the top of the upstream portion of the reef cleanly scoured and in condition to receive fresh accretions of young oysters. As the crest of the reef is crossed, the velocity is again lessened by reason of the larger cross section of its available channel in deeper water, and there is a deposit of silt upon the downstream side of the bed, rendering it less adapted to a set of spat. When the level of the water is below the crest of the reef, a generally similar result is brought about by somewhat different means. Then the entire discharge passes through the several channels by which the reef crest is traversed, especially those at Dog and Tiger islands. There is a current of varying strength running lengthwise of the northeast side of the reef and a swift current through the channels, but as soon as it passes the barrier the silt-laden water spreads out and eddies after leaving the channels, and there is again a tendency to the deposit of mud.

When the tidal currents are reversed and the flow is running up the bay the conditions of silt deposit also are reversed, and were it not for two important factors there would result a general similarity rather than a marked diversity in the aspects of the two sides of the reefs. As has already been stated, the average velocity of the inflowing current must, from the relative positions of the stream mouths and the mouth of the bay, be less than that of the outflowing, and it is therefore physically unable to take up and return much of the material carried down and deposited by the latter. In the second place, and entirely independent of the previous consideration, the water in the lower bay, coming in large part from the sea, is clearer than that above Dog Island. The streams are the main sources of silt. This is gradually deposited in the course of the water toward the sea, and, once deposited, would require a higher velocity of current to pick it up again than sufficed to carry it originally.

In the light of this preliminary understanding of the action of the currents and the local distribution of the silt deposits, let us examine the effect upon that growth of oysters which fixes the final characteristics of the beds. Upon the "up-the-bay" side of the reef we find a deposit of silt from the more stagnant bottom strata of water inhibiting a set of spat at the foot of the barrier while at the same time the flowing surface water is exerting a scouring action on the top of the reef northeast of the crest. The preponderance of oyster growth is therefore at the top of the reef and toward the upper margin of that side, with the result that the margin in question tends to maintain a uniform outline and an abrupt face. The crest itself lies closer to the northeast margin, because it, too, tends to grow in that direction from the same causes—the superior scouring action and food-carrying capacity of the currents on that side of the reef. It can never grow to a level much above the low-water plane, because as it rises above that level the oysters are each year killed by exposure to the air for long periods during the low water prevalent in the winter months. On the opposite side of the reef, as we have seen, the conditions are essentially different. Immediately upon crossing the crest the outflowing water begins to deposit silt, which falls most abundantly in the lower levels between the oyster clusters, and the latter soon become, therefore, the only places on that side of the reef presenting conditions inviting a new set. Wave action, too, being more energetic near the surface, tends to scour those areas raised somewhat above the bottom, especially those surfaces looking toward the margin of the reef, and silt thus washed away is likewise thrown down in the neighboring pools and crevices. The result is that the original oyster clusters having this advantage gradually grow into clumps, and these, by virtue of the greater cleanliness of their outer ends

more exposed to the waves, eventually develop into tonguelike ridges at right angles to the general trend of the reef, with muddy silted sloughs between them.

In the discussion thus far, particular consideration has been given to Dog Island Reef, where the conditions are most marked, but the statements will apply with gradually decreasing force to the reefs below. By virtue of its proximity to Dog Island channel, which acts in relation to it much as the Colorado does to Dog Island Reef, Shell Island Reef presents the same characters, though less marked, the upper margin being abrupt, and the spurs and sloughs on the opposite side of the crest being relatively shorter and less differentiated. Mad Island Reef being shorter, there is a wider avenue for the passage of currents around its end. The channel at the inner end of Shell Island is not so large, and therefore discharges less water to impinge on the reef below, and finally the water, by the time it reaches this reef, has had an opportunity to deposit no inconsiderable part of its silt, all of which factors still further reduce the formation of spurs on the lower side of the reef. At Half Moon Reef the lower margin is almost entire, but the conditions are still such, by virtue of the preponderating current velocity from the upper bay, that the crest maintains its proximity to the eastern face, and the oysters are better, larger, and more abundant on that side. From Dog Island Reef to Half Moon Reef there is therefore a gradual transition in correspondence with the waning influence of the conditions above indicated.

SHORT REEFS AND LUMPS.

The short reefs, or "lumps," as they are usually called, are found principally in the upper part of the bay, though there are a few below Dog Island Reef. They are simply old oyster beds in which the growth is localized, and as a rule they are developed in those places where the currents are less marked than they are below the mouth of the Colorado River. They rise from soft muddy bottoms, which tends to restrict their expansion laterally, and their growth is principally at the top. They often consist of dense bodies of raccoon oysters.

FLAT BEDS AND PATCHES.

The patches or flat beds are confined to that part of the bay above the vicinity of Dressing Point. They are relatively young, and in many cases their origin can be traced to artificial causes, the culling and throwing overboard of shells and young oysters from boats on their way to market. Many of them formerly produced oysters of excellent quality, and under proper density conditions this phase of their history would undoubtedly be repeated.

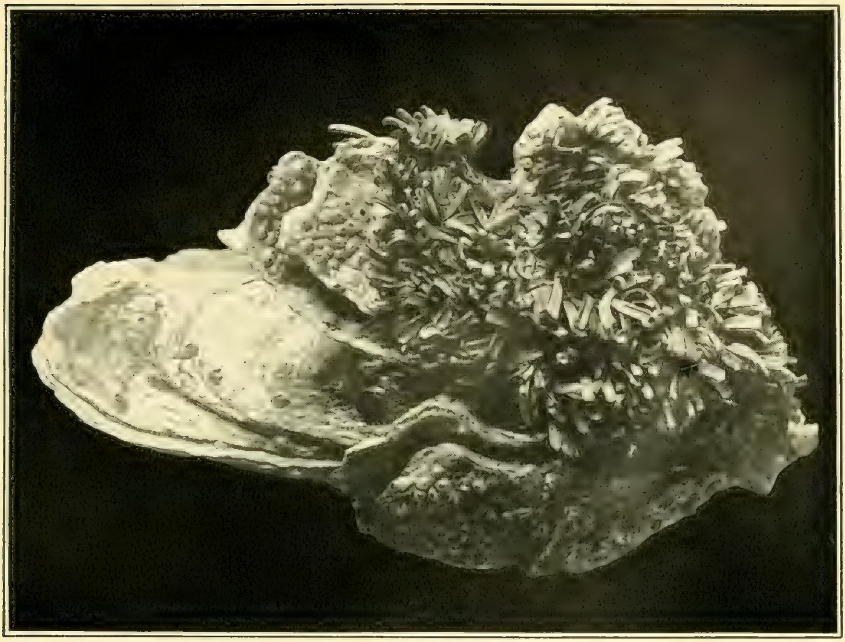
PRINCIPAL OYSTER BEDS IN MATAGORDA BAY.

HALF MOON REEF.

This, the westernmost limit of the survey, is an economically important reef, setting in a generally southwesterly direction from Palacios Point to and beyond Half Moon light. It has a total length of about 5,200 yards and an average width of about 500 yards, embracing an area of approximately 494 acres. Between its inner end and Palacios Point there is an area of soft mud, with a width of from 300 to 500 yards and a depth increasing from about 1½ feet close to shore to upward of 3½ feet at low water on and for a short distance beyond the edge of the oyster bed. This deeper water constitutes Palacios Point channel, much used by boats plying to and fro between the upper bay and the town of Palacios. Stretching practically the entire length of the reef, with here and there an interruption, there is a backbone of shells and oysters lying in a depth of less than 1 foot at the mean low water of winter. Surrounding the light there is a depth of about 4 feet, shoaling rapidly on each side. The shoal crest is nearer the southeast side of the reef, and, as in the other long reefs hereafter described, the slope is relatively sharp in that direction, although, excepting the extreme end, there is not so abrupt a rise at the margin as on Dog Island, Shell Island, and Mad Island reefs.

Excepting at the two ends, where the edges of the bed lie in about 3½ feet of water, the limit of oyster growth is generally in a depth close to 1 fathom. The reef is growing comparatively rapidly at its outer end, and it now extends from 400 to 500 yards farther toward the southeast than it did when the hydrography of the Coast Survey was executed. That it is a very old reef is shown by the depth from which it rises and by the results of probings through an almost impenetrable mass of shells and compacted fragments at least 3 or 4 feet in thickness. As in the cases of the other beds of the region, it began by the fixation of a few oysters to some firm foreign body lying in mud of a consistency similar to that now surrounding it, and upon the shells so grown successive generations set until the whole area became covered and the level was gradually raised higher and higher above the normal bottom. It is still building up, and, as stated, comparison with the previous survey shows that its horizontal dimensions, and particularly its length, are increasing with comparative rapidity.

According to local witnesses its productiveness has fluctuated greatly, more or less long periods of barrenness having been succeeded by periods of rejuvenescence and fecundity. Local authorities state that there were no oysters on it in 1895 and for several years thereafter, but about 1900 there was a heavy set of spat which grew to market-



1. OYSTERS FROM HALF MOON REEF, SHOWING "RED GRASS" (EGG-CASES OF PURPURA).
Reduced $\frac{1}{2}$.

2. OYSTERS FROM HALF MOON REEF, SHOWING PITS AND CHAMBERS OF BORING CLAM (MARTESIA). Reduced $\frac{4}{9}$.

able size about 1902, since which year it has been fished each season. During at least a part of the season of 1904–5 it was the most extensively tonged bed in Matagorda Bay, about 50 boats being constantly at work on it during November and December. Apparently there has been no heavy set of spat in recent years, and the area which has been most extensively worked during the past two or three seasons is showing distinct indications of such exhaustion that unless soon replenished with a young growth it will speedily again become barren. At the inner end, in the area shown on the chart as a very scattering growth, a number of boats operated early in the season, but when this portion was examined in the latter part of April there was practically no young growth and an average of but one adult oyster per square yard. This part of the bed covers about 56 acres and was estimated to contain but approximately 1,000 barrels of oysters, about 18 barrels per acre. Between 300 and 800 yards shoreward of the light the same conditions obtain, there being an average of but two adults per square yard. The oysters in both of these localities are almost without exception large, single, and of good shape. Beyond the light the growth is sparse, and no fishing is done there. Of the very scattering oysters on the outer third of the reef it is estimated that there are about 4,400 barrels, covering an area of 176 acres.

The densest area at the time the reef was examined lay on the southeast side of the crest between 800 and 3,500 yards from shore, on which there were per square yard 35 oysters over and 11 under 3 inches in length. On this section there were estimated to be in April, 1905, about 30,000 barrels of adult oysters, covering an area of 87 acres. This area had been rather thoroughly fished during the season, and in places had been almost "cleaned up," leaving but a scattered growth. The oysters are good in size, shape, and quality. Many of them, especially in areas which have been tonged, are single, shapely individuals, but in the parts less extensively worked they are large, clustered, and more elongate. They are best near the margin of the reef.

The part of the reef lying northwest of the crest was not examined in detail, but general observation showed it to possess the same relative characters as the corresponding portions of the other long reefs hereinafter described. There is a scattering growth of poor, small oysters, covering an area of about 175 acres.

The shells of oysters from Half Moon Reef are characterized by abundant pits and chambers excavated by the boring clam, a more detailed account of which will be found in the section of this report dealing with oyster enemies. The yellow boring sponge, which honeycombs the shells with its galleries, is also abundant; there is a sparse growth of mussels, and in April, 1905, many of the shells bore clusters

of the red egg cases of the so-called borer, *Purpura*. These cases are often referred to by the oystermen as "red grass." The drumfish is said to be destructive at times.

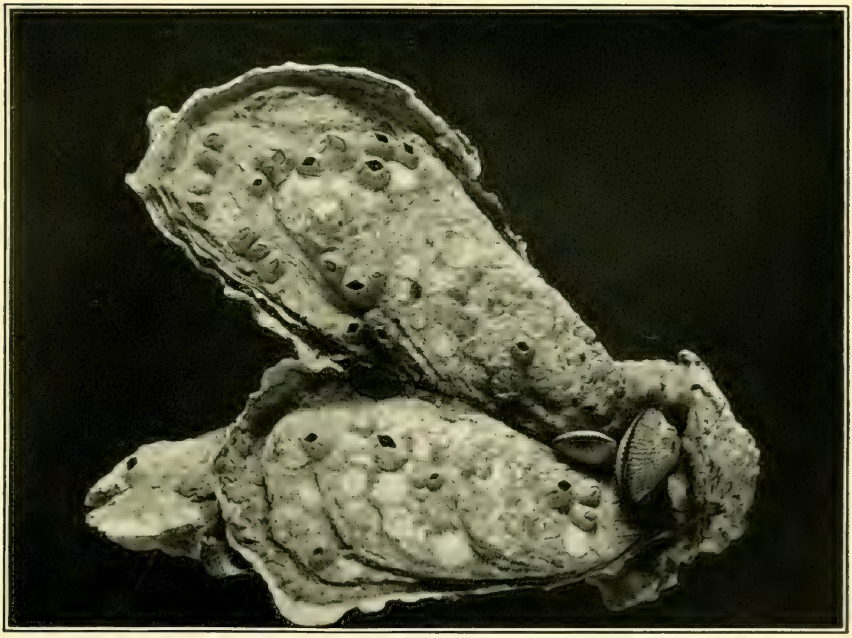
One of the chief characteristics of the oyster growth is the scarcity of young oysters. This is a serious matter, and indicates an approaching period of unproductiveness unless there is a speedy change for the better.

MAD ISLAND REEF.

This is the smallest of the Matagorda Bay "long reefs." It stretches in a generally southeasterly direction for a distance of about 2,000 yards from the north shore at Mad Island West signal, with an average width of about 300 yards and an area of about 93 acres exclusive of the exposed crest, which extends for practically its entire length. Apparently this reef has not grown at its offshore end as have Half Moon and Shell Island reefs, a fact that may be explicable on the assumption, based on local reports, of its periodical destruction. It is known that on at least one occasion, about 1896 or 1897, it was almost if not entirely destroyed by fresh water, grass, sand, and debris carried upon it by a freshet in the drainage basin of Mad Island Lake, and it is stated that similar disasters had before visited it. After an interval of several years it became reseeded by a heavy set of spat, and during the season of 1904–5 the oysters became marketable and were in considerable demand at Matagorda. The reef lies on a deep, dense bed of shells, compacted with fragments and sand, lying on a foot or two of soft mud, which in turn is underlaid by hard mud. The margin of the bed lies in a depth of about $1\frac{1}{2}$ feet of water at the shore, with gradually increasing depth to 5 feet offshore. The crest, which is close to the eastern margin, is more or less covered with a growth of raccoon oysters, and at its inner end has an elevation of 6 or 8 inches above the low-water plane adopted in this report. The eastern margin is well defined and continuous, and it is near this limit only, over an area of about 23 acres, that marketable oysters are found. There was in April, 1905, on the reef east of the crest, an average per square yard of about 42 adult oysters and 28 small ones, and from these data it is estimated that there were at that time approximately 9,000 barrels of marketable oysters. Both young and adults had well-shaped, clean, thin shells and the marketable stock was of good size and flavor, with a considerable proportion of single oysters and few clusters of more than 3 or 4 individuals. The preponderance of single oysters and small clusters is directly attributable to tonging, a number of boats having operated on this part of the reef during the season preceding.

On that part of the reef lying west of the crest the conditions are quite different. The area is much larger, about 70 acres, and the reef slopes gradually away from the crest to a more or less indented

1. HALF MOON REEF OYSTERS. Reduced $\frac{2}{7}$.



2. MAD ISLAND REEF OYSTERS. Reduced $\frac{7}{16}$.

margin, not shown in all its detail on the chart. The oysters are smaller than on the eastern side and their density is less, the difference being especially noticeable in the larger stock. Of oysters under 3 inches in length there are about 36 per square yard, while those 3 inches or over number but 16 and most of these barely exceed the size limit set, while on the eastern side the adults average over 4 inches. To the westward of the crest the oysters are not only poor in size and shape, but inferior in quality. As it is to be assumed that the entire reef was reseeded at about the same time, the diversity between the two sides must be due to diversity in conditions, more especially as regards the food supply. It is estimated that the west side of Mad Island Reef contained in April, 1905, a total of about 2,500 barrels of oysters about 3 inches in length, and practically all of these were worthless for the market.

There are several small patches or lumps near Mad Island and Shell Island reefs, but they were too small to plot satisfactorily.

SHELL ISLAND REEF.

This is a long, narrow reef extending from about one-fourth mile outside of Shell Island nearly to the north shore at Mad Island signal. It has a length of about 1½ miles, an average width of about 250 yards, and an area of about 145 acres. In its general features it is but a smaller copy of Dog Island Reef, and in the course of time it will eventually form a barrier extending practically across the bay, there being evidence that it has increased about 500 yards in length during the past fifty years or less. A crest exposed during low winter tides runs the entire length of the reef, interrupted at a point about 100 yards north of Shell Island, where there is a channel about 20 feet wide carrying about 2½ feet of water at low tide, and again near the shore end, where there is a wider channel with about the same depth. The crest has an average width of 40 yards and bears a scattered growth of oysters of raccoon type.

The two sides of the reef present the same diversity observed in the other long reefs of the vicinity, the eastern side being productive, while the western side is commercially almost worthless. The eastern margin of the reef is regular in contour and lies close to the crest, the water therefore shoaling abruptly. On Shell Island Reef the productive area includes the entire southern part outside of Shell Island Channel and extends well up the eastern side, becoming less important as the water shoals toward the shore. This eastern strip is very narrow and the total area of dense growth as shown on the chart is only about 25 acres. Examinations indicated a density over this area of about 106 adult and 70 young per square yard, and the total of adult oysters is estimated at 35,000 barrels, an average density of about 1,400 per acre. It is possible that this estimate is some-

what too high owing to the fewer large oysters found on the northern part of the eastern side. The density of growth is greatest near the margin of the reef and becomes less as the crest is approached. A few boats fished on the productive area during the season of 1904–5, but the bed has been resorted to but little since 1902–3, when it was more or less depleted by the oystermen. The present supply has been growing since then. It is reported that ten years ago it yielded an annual output.

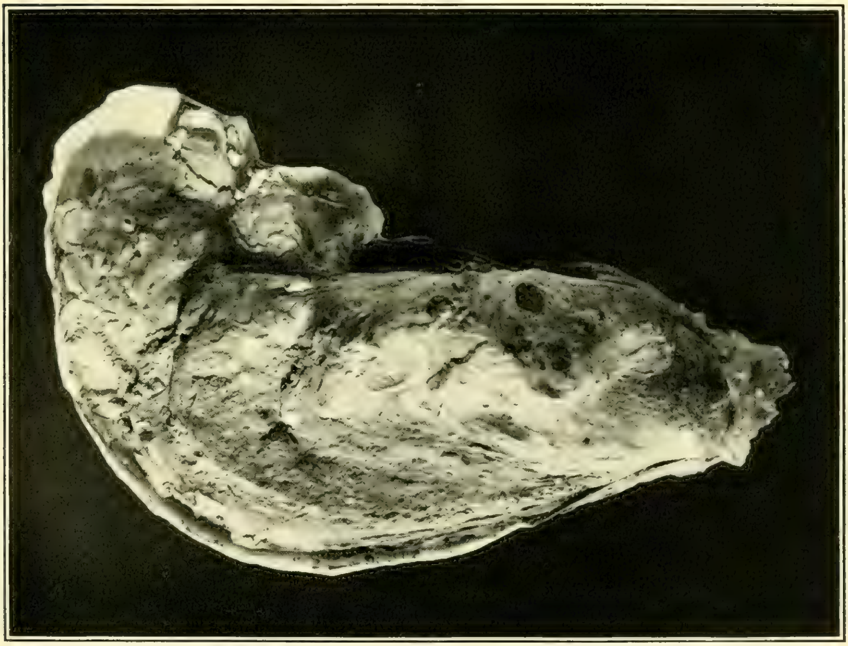
The west side of the reef, though of much greater extent, is like the corresponding parts of the other long reefs of Matagorda—of practically no value commercially. It extends from Shell Island to within about 100 to 150 yards of the shore, with an average width of about 200 yards and a total area of approximately 120 acres. It is much indented on its western margin with projecting tongues of shelly oyster-bearing bottom separated by muddy bights and blind channels (not shown on the chart). The oyster-bearing bottom contains an average of 67 young oysters per square yard, practically the same number as on the productive area before described, but the number of oysters over 3 inches long is only about one-fourth as great and the average size of the individuals is so much less as to make them practically useless for the markets. It is estimated that there are about 7,500 barrels of 3-inch oysters on this part of the reef, an average of 63 barrels per acre, excluding the muddy areas. The slope from the surrounding mud to the exposed crest is more gentle than on the eastern side. The oysters are generally of raccoon type and are never taken for the market.

FORKED BAYOU REEF.

This reef lies about one-half mile northwest of the mouth of Forked Bayou, is about 200 yards long and 100 yards wide, and has an area of about 4 acres. It is an old bed reposing on a mass of shells, has a depth of about 2 feet at low water on its crest, and rises from a surrounding depth of from 4½ to 6 feet. It is said to have been overwhelmed and partially destroyed by sand during the gale of 1875, a statement that is substantiated by the presence of a layer of sand about 1 foot below the present deposit of shells and oysters. Oystermen state that it has been fished more or less regularly for the past thirty years, and several boats were working on it at the time the survey was made.

In April, 1905, this reef had an average density per square yard of 31 oysters over and 30 under 3 inches in length, both old and young being more abundant toward its eastern edge. Its total contents of marketable oysters are estimated at 1,500 barrels, an average of 375 barrels per acre. The adults are large (averaging from 4½ to 5 inches long) and broad, with clean shells of moderate

1. OYSTERS FROM SHELL ISLAND REEF. Reduced $\frac{1}{2}$.



2. OYSTER FROM FORKED BAYOU REEF. Reduced $\frac{1}{4}$.

thickness. The clusters are small and foreign growths scanty, though a few shells showed the marks of *Martesia*, the boring clam, which is so abundant on Half Moon Reef. On April 18 some of the oysters were spawning.

The flavor, shape, and general condition of these oysters was excellent, this being due in part to the persistent tonging on the reef year after year and in part to the extraordinary abundance of food, which is mentioned in the part of this report dealing with that feature of the survey.

DOG ISLAND REEF.

Dog Island Reef is the largest and, with Half Moon Reef, economically the most important bed of Matagorda Bay. With the exception of several narrow channels it forms at low water a complete barrier, stretching from shore to shore a distance of about $3\frac{1}{4}$ miles, with an average width of about 800 yards, and comprises within its limits an area of about 932 acres, exclusive of the crest which is exposed at low water. Its southeastern end is frequently referred to as "Tiger Island Reef," but as the growth is absolutely continuous from shore to shore, the one name is adhered to in this report.

The reef is a very old one, as may be inferred from its dimensions, and its core consists of a mass of shells impenetrable to the steel-shod probe. Excepting where interrupted by the channels this core extends to the very crest of the reef, where it is covered by a sparse growth of racoon oysters, which, owing to the prolonged exposures to the air during the low tides of winter, is annually almost exterminated and added to the accumulation already existing. This crest, built up by oyster growth and the mud and broken shells thrown up by the waves, extends from within 200 yards of Dog Island to within about the same distance of Tiger Island with but one important break, near the middle, where a channel has been cut. Its extreme width at low water is about 250 yards, but it is very irregular, with many patches which never go bare. The clustered oysters in all parts of the reef bear barnacles and a few mussels, but the latter are never in sufficient quantities to be detrimental. Oystering up to the present time has been almost entirely confined to the vicinity of Tiger Island and the east side. The yield during the season 1904–5 can not be definitely stated, but it is probably not very far from 50,000 barrels.

North end.—At the northern end of the reef, stretching from Dog Island channel almost to the shore, there is an area of about 113 acres which, with the exception of a 7-foot hole near the point, is covered with two feet or less of water during winter low tides. The bottom consists of hard sand and shells with a somewhat greater preponderance of shells near the channel. Several sections indicate

an average per square yard of 6 oysters over and 49 under 3 inches in length. Of even the larger size very few individuals are found which measure $3\frac{1}{2}$ from end to end and practically all of the smaller ones are between 1 and 2 inches, and the shells of all are more or less covered with barnacles and have a greenish coloration, indirectly due to their frequent exposure. This part of the reef is estimated to contain about 2,200 barrels of oysters over 3 inches long, an average of only about 20 barrels per acre, which is therefore shown on the chart as a very scattering growth, though it is in reality a rather dense growth of small oysters. The shells of the larger oysters especially are thick, indicating probably considerable age and slow growth. The bed is worthless for commercial purposes, though the oysters might be used for planting.

East side.—The eastern margin of the reef is regular in contour and sharply defined, and the bed rises sharply from the adjoining muddy bottom to meet the exposed crest. For the purposes of this report, it is considered to extend on the eastern side of the crest for its entire distance, with a length of a little over $2\frac{1}{2}$ miles and an everage width of 100 yards in the northern and 200 yards in the southern half. At the extreme edge of the reef the depth is from $2\frac{1}{2}$ to $3\frac{1}{2}$ feet, rapidly decreasing toward the crest.

There is a dense growth of good-sized oysters over the entire eastern side, though in places, especially toward the south end, it was more or less fished out during the season of 1904–5. A number of examinations indicate an average content per square yard of 83 oysters over 3 inches and 66 under that length. It is estimated that this part of Dog Island reef probably had on it in April, 1905, about 145,000 barrels of oysters of the larger size, a general average for the entire area of about 1,000 barrels per acre, exclusive of the young. In the northern half the density of both adults and young is greater, especially the latter. Past the middle of the reef toward Tiger Island the adults are very much in preponderance. The diminished population of the southern half of the bed is directly traceable to the extensive oystering carried on there during the present and preceding seasons. It is said that the season of 1904–5 was the first in many years when the northern half of the reef had been worked, and many good oysters were obtained, especially near and in Dog Island channel. The product of the two localities differs in general character, the oysters of the northern part being in larger clusters and more elongate, while single oysters of rounder shape are more frequent toward the southern end. The densest growth of both adults and young was found toward the middle, where the excess over the average was about 75 per cent. The quality of the oysters is good.

South end.—This is commercially a very important part of the reef, which for the purposes of this report is arbitrarily considered to in-

1. OYSTERS FROM DOG ISLAND REEF NEAR TIGER ISLAND. Reduced $\frac{3}{7}$.

2. OYSTERS FROM WEST SIDE OF DOG ISLAND REEF. Reduced $\frac{2}{7}$.

clude those oyster beds lying between the southern end of the crest at Ring Island and the shores of Greek and Tiger islands, an area of about 139 acres. The oyster density here was determined to be, per square yard, about 24 oysters over and 14 under 3 inches in length. The contents in the middle of April, 1905, were estimated at about 13,000 barrels, an average of approximately 90 barrels per acre, but it must be remembered that this was at the end of the oystering season, after many boats had been working for months. At the beginning of the season the contents were many thousand barrels in excess of this estimate. This part of Dog Island Reef produces the best quality of oysters, and there is a preponderance of large, single individuals 4 inches or more in length and of excellent shape, with the remainder of the stock in small clusters of two and three. This condition is, of course, largely due to the persistent oystering each season, which results in the breaking up of the clusters which would be produced under purely natural conditions. In the western part of the area the oysters are somewhat more irregular and single oysters fewer. Here the bottom is softer, while closer to Tiger Island it is hard and shelly. Tiger Island channel flows through this area, and the currents running there, augmenting the food supply, are undoubtedly responsible for the good condition of the oysters. It is stated by Captain Sterling, the local deputy fish commissioner, that prior to 1867 there were no oysters on the Tiger Island end of Dog Island Reef, where the best and fattest oysters put on the market in 1904–5 were obtained.

South of the area just described there are 400 to 500 acres of scattering oysters, extending almost or quite to the south shore. It is understood that this is a private claim and has been planted. It was not examined in detail. About three-fourths of a mile west of Greek signal are two small, dense beds, shown on the chart, which also were not examined in detail. They are fished for the market, and are known as Sherman and Snapper banks, respectively.

West side.—The west side of the reef, though covering a larger acreage than any of the other parts described, is economically of no importance and is never worked. It differs greatly in character from the east side. On the chart its southwest margin is shown as a reasonably continuous line, but in reality numerous tongues and bights of soft, muddy bottom, devoid of oysters, project into it, in many cases almost halfway to the crest, and these enormously decrease the oyster-bearing area, as shown. The slope from the margin to the crest is also more gradual, although some of the oyster-bearing ridges are rather abrupt at their outer ends. The oyster-bearing areas of this part of the reef, which it is estimated constitute about 30 per cent of that shown on the chart, have an average density per square yard of 32 oysters over and 30 under 3 inches long. The growth

is more dense toward the north, gradually diminishing southward. The contents are estimated at about 18,000 barrels, an average density of 34 barrels per acre.

The adults average barely 3½ inches long and the small oysters about 2 inches. The former are very hard-shelled and heavy, and bear every evidence of a stunted growth.

SPRING BAYOU REEF.

This is a compact bed about 900 yards long and 200 yards wide, containing about 32 acres, and lies between Fence and Greek signals and about two-thirds of a mile off the mouth of Spring Bayou. It is an old bed, lying on a moderate thickness of old shells, but is probably of more recent origin than Boiler Bayou or Raymond Landing reefs. It is said to have produced good oysters several years ago and to have been worked during the season of 1902–3, but not since then.

The average catch per square yard was 84 oysters over and 98 under 3 inches long, and there were estimated to be on it at the time of examination about 30,000 barrels of the larger size, a density of about 940 barrels to the acre. The adult oysters average a little over 4½ inches in length. About half the catch consisted of single or double oysters, the remainder being in clusters of moderate size, with mussels and some barnacles attached. Some of the larger clusters contained oysters of elongate form and considerable size, but on the whole the individuals were of much better shape than on either Boiler Bayou or Raymond Landing reefs, and in fact than on any of the dense beds above Dog Island, with the single exception of Boggy Lump. It is not unlikely that this is due to the fact that the bed has been worked at a comparatively recent period, the clusters being thus more or less broken up and the younger oysters permitted to grow less subject to crowding. It is noteworthy in this connection that the older clustered oysters more closely resemble the specimens of similar age on Boiler Bayou Reef, though perhaps averaging a trifle greater in transverse diameter.

BOILER BAYOU REEFS.

These beds lie about three-fourths of a mile off Fence signal. It is stated that they were "first known to the oystermen about eight years ago," but this should probably be held to mean that they were not worked prior to that time. It is doubtful whether beds of this extent rising so near to the surface at low water could have remained undiscovered, in view of their proximity to Matagorda and the fact that they lie in the course of boats bound to the upper part of the bay.

Boiler Bayou Reefs, as developed by the survey, are three closely segregated beds, with areas of about 28, 7, and 1 acre, respectively. They all repose on dense masses of shells several feet in thickness,

1. SPRING BAYOU REEF OYSTERS. Reduced $\frac{1}{2}$.

2. BOILER BAYOU REEF OYSTERS. Reduced $\frac{1}{2}$.

through which it is almost impossible to thrust the probe to the underlying mud, and they have over their crests a depth of between $2\frac{1}{4}$ and 3 feet at the mean low water of the winter months. The margins of the reefs are very sharply defined, and the water shoals abruptly from a depth of $4\frac{1}{4}$ to 5 feet on the surrounding soft mud.

The beds consist of densely packed clusters of adults and young, with, in some cases, a considerable growth of mussels. A detailed examination of several parts of the reefs indicated an average density per square yard of 67 oysters over the 3-inch limit and 101 under it. It is estimated that there are on these beds, which have a total area of 36 acres, at least 25,000 barrels of oysters of the larger size, which average from $4\frac{1}{2}$ to 6 inches in length with a considerable number reaching a length of 9 or 10 inches.

Taking them all in all, these adults are the longest and narrowest found in the bay, the extreme types of elongation being found in the center of the clusters, while the peripheral individuals, less subjected to the pressure of their fellows, are often broader and better shaped. Many small oysters, from three-eighths inch and upward, are found on the clusters and dead shells, and the beds are evidently prolific. On the northern edge of the reef the clusters are smaller and very irregular and jagged. The flavor and condition of the oysters are inferior.

It is stated that Boiler Bayou Reefs have not been fished for three or four years, a fact also indicated by the character of the growth. It is now difficult to tong owing to the close aggregation of the clusters.

RAYMOND LANDING SHOALS.

These beds as developed by the survey consist of thirteen lumps and patches ranging in area from about 1 to 23 acres. They lie nearly in the middle of the bay between Duncan and Fence signals and stretch in two series over a length of about 2 miles and a width of nearly two-thirds of a mile, the northwestern chain containing nine oyster-bearing areas and the southeastern series four. The total area is about 80 acres, approximately equally distributed between the two chains, the acreage of the individual beds being generally of small extent, one containing 23 acres, one 13, three between 7 and 10, and the other eight less than 3 acres each.

These beds are in most cases very old, lying on shell deposits several feet thick, but several of those in the western half of the northern chain are of more recent origin, and repose with but slight shoaling on the generally muddy bottom of this part of the bay. The general depth of the surrounding water is about 4 to $4\frac{1}{4}$ feet, but on the crests of the older lumps there is but $1\frac{1}{4}$ to $2\frac{3}{4}$ feet during the average low water of the winter months. While the crests of these beds are apparently not exposed during even the most extreme low tides, their position can often be readily seen by the dark color overlying them.

Raymond Landing Shoals are impediments to the navigation of the bay, and the boatmen usually maintain stakes to mark their outside limits.

A number of observations on the dense beds indicate an average per square yard of 90 oysters over 3 inches in length, 112 between 1 and 3 inches, and 147 under 1 inch. It is estimated that these beds contain approximately 45,000 bushels of oysters over the limit of 3 inches, an average of about 560 bushels per acre. The production of small oysters, or at least the proportion of small to large oysters, is here far greater than on any other beds in the bay, and this is practically the only place in which the product of spat—that is, oysters under 1 inch long—is numerically predominant. It is not at all unlikely that this preponderance may be in a measure due to slower growth, but it can not be denied that the opportunities for spat collection are excellent. Some shells bear as many as 50 infant oysters.

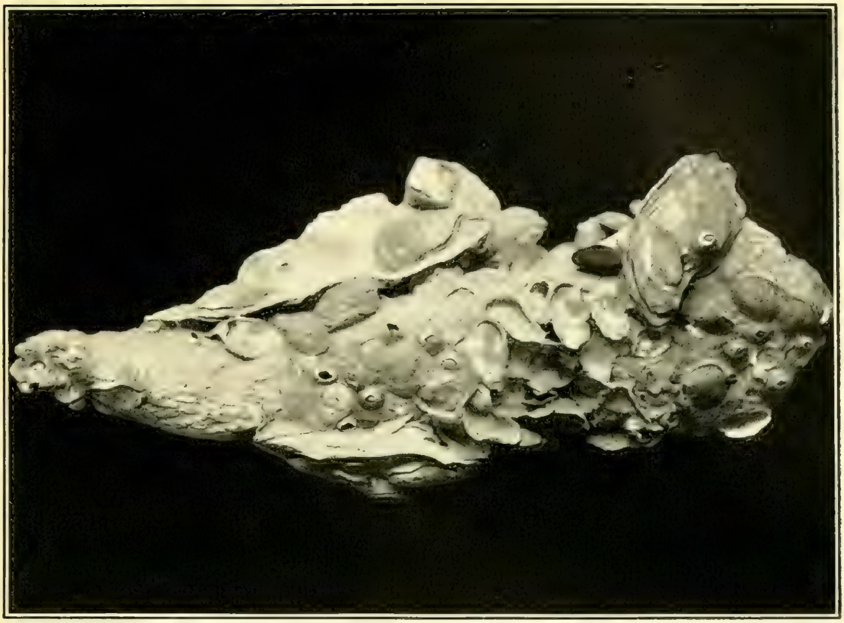
The oysters are generally in dense clusters of from 3 to 6 adults and more than twice that number of young and spat. The larger individuals are long, narrow, and thin, averaging about $4\frac{1}{2}$ inches in length, with many considerably longer. They are generally poor in shape, condition, and flavor. In general they resemble those of Middle Patches, but are considerably larger than are found on Middle Lump. The growth is so dense and the living oysters so strongly adherent to the underlying shell beds that tonging is extremely difficult.

The oysters on Raymond Shoals, owing to their shape, are worthless for shell stock or shucking, but they could be utilized to advantage for canning, for which purpose the stock is opened by the aid of steam. In the event of their being used for this purpose there would be inevitably a great destruction of the young, which form an important component of the clusters, but it is undoubted that anything resulting in the judicious working of the beds would be of advantage. The oysters, as in others of the dense beds herein described, are now so closely crowded that they can not grow to good shape, nor is there food enough in the surrounding water to supply the untold individuals each with sufficient for its proper nourishment and the production of a desirable quality of meat. The beds are more or less overgrown with mussels.

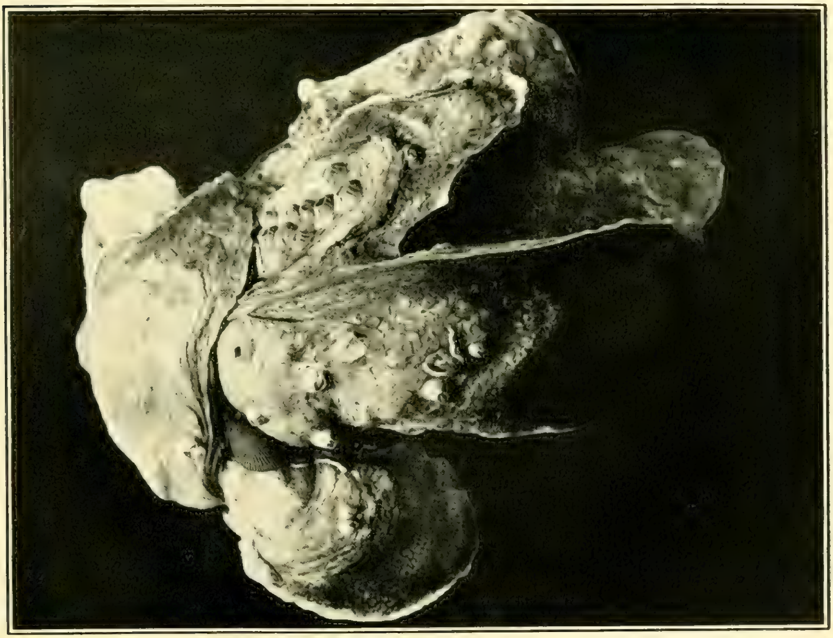
So far as could be learned, Raymond Landing Shoals have never been worked, and it is probable that the inferior quality of their product is a characteristic of very long standing.

KAINS AND CLEVELAND PATCHES.

These are several very scattering growths of oysters lying between 200 and 400 yards offshore, the former in the vicinity of Kains Landing and the latter off Cleveland Bayou, just east of Duncan signal.



1. OYSTERS FROM RAYMOND LANDING SHOALS, SHOWING HEAVY SET OF SPAT. Reduced $\frac{1}{2}$.



2. BOGGY LUMP OYSTERS. Reduced $\frac{3}{4}$.

A detailed examination showed an average of but very few oysters per square yard. It is understood that there are planted oysters in this vicinity, and it is not improbable that these are they, though there are no stakes or other marks which would clearly indicate that these are private beds.

MIDDLE LUMP.

Middle lump is a dense bed lying in the middle of the bay opposite North Base signal. It has a length of about 400 yards and a width of about 175 yards, with an area of about 12 acres. The bed is an old one, with a great depth of shells, rising to within about 2 feet of the surface of the water from a surrounding depth on the soft mud of 4 to 4½ feet.

The clusters are generally of medium size, but composed of numerous closely crowded individuals averaging from 3 to 3½ inches in length, with a somewhat greater number of smaller oysters. Sections examined showed a density of 163 of the larger and 210 of the smaller individuals per square yard. The clusters were so densely crowded that tonging was extremely difficult. The individual oysters are thin-shelled, sharp-edged, and more or less elongate and irregular. The flavor is inferior. Some of the clusters bear considerable numbers of mussels, but they have not yet become the menace found in the upper bay. So far as the actual production of individuals is concerned, this is the densest bed in the entire bay, but the stock is small and therefore less in actual bulk than on several other beds.

Middle Lump has apparently not been worked for some years, if ever.

BOGGY LUMP.

This is a small but important bed from which many good oysters have been derived in former years. It is about 250 yards long and 100 yards wide, with an area of approximately 5 acres. The bed is uniformly dense and compact, rising rather abruptly from soft mud in 4 feet of water until its crest is covered with slightly less than a foot at the low-water plane to which soundings are referred in this report. The shoal water on its crest and the mass of shells, 3 feet or more in thickness, upon which the living oysters lie show plainly that this is an old bed.

Reports state that remarkably large quantities of oysters have been marketed from Boggy Lump in years past, and the detailed examination made by the survey fully substantiates the statements. An average per square yard of 182 oysters over 3 inches long and 81 below that length was found, and the catch was the cleanest and best made anywhere in the upper waters of the bay. The oysters have a fine shape and grow in good clusters of 4 or 5 marketable individuals each. The adults average about 4½ inches long, are

somewhat elongate, but not objectionably so, and at the time of the survey were quite fat, though insipid in flavor owing to the low density of the water (about 1.0040). There are a few barnacles and mussels, but the latter have not yet obtained the footing noted on other beds in the upper bay.

The density of growth on the bed is quite uniform and remarkable, averaging about 2,200 barrels per acre, a total of 11,000 barrels for the bed. The author knows of no productiveness approaching this in any oyster region with which he is familiar. The bed is evidently a valuable one, but has not been fished during the present season (1904–5) owing to the low salinity of the water and the resulting inferior flavor of the oysters. Should the proposed new cut be completed and maintained, Boggy Lump should yield a good product.

GRASS LUMP.

Grass Lump is a small, dense reef about 300 yards from shore and about the same distance east of the mouth of Boggy Creek. It is an old reef, elevated several feet above the surrounding bottom so that its crest is nearly awash at low water. At the time of the survey its position was marked by a stake. The oysters are thin-shelled, sharp-edged, and irregular in outline, the adults averaging about 4 inches in length, and single individuals and small clusters predominate. There are no mussels, but many barnacles, and the oyster shells are characterized by a bright green color in places. The small ones are hard-shelled, heavy, and with crenate edges, such as are usually possessed by small oysters in localities where the water is shoal and the bottom hard.

The detailed examination yielded an average count per square yard of about 55 oysters over 3 inches long and about 61 young. Most of the young were between 1 and 2 inches long. The catch on this bed contained many dead shells, but most of these were old and derived from the dense shelly mass, 2 to 3 feet deep, on which the living bed lies. It is understood that this bed has been worked in former years, but nothing was done on it during the present season.

IDLEBACH PATCHES.

These lie on the western edge of Idlebach Flats, a sandy shoal extending for upward of one-half mile from shore between East Point and North Base signals. The growth is a very scattering one of small patches, each containing a few oysters, single or in clusters. Several sections examined on the most prolific bottom gave an average of about 9 oysters per square yard, but this production is not maintained over a very large part of the area shown on the charts.

These oysters are the largest and best shaped occurring east of Dog Island Reef. They are much broader and thicker than those found on the neighboring muddy bottom and averaged from 5½ to 6 inches in length. The shells are moderately thin and the meats plump, though the flavor is brackish. They would make excellent "shell stock" were the salinity of the water somewhat higher. The proportion of young oysters is small. There is a number of large dead shells. These beds were formerly fished, and are said to have yielded a fair quantity of excellent oysters.

MIDDLE PATCHES.

The name Middle Patches is given to six heretofore unnamed, small, compact bodies of oysters lying in the middle of the bay between Boggy Creek and Idlebach Flats. Of these, four have a dense growth and two are scattering, as shown on the chart. The existence of some of these beds is known to the oystermen, though not their exact position. They are difficult to find, owing to their small size and slight elevation above the surrounding bottom. They range in area from 1 to 2½ acres, the total acreage being about 10.

The dense beds are very productive, detailed examination showing in places an average per square yard of 135 oysters over and 78 under 3 inches in length. On the scattered beds the yield is much below this, but still considerable. These beds, even the dense ones, are not very old, the deposit of shells being less than a foot in thickness and the water over them shoaling but slightly, but there is evidence to show that one of them at least occupies the site of a former bed, which has become covered with a deposit of sand and mud 2 feet deep.

The beds are composed of rather large, heavy clusters of living oysters and dead shells, often embedded for a considerable part of their length in the soft mud. There are very few single oysters. The average adults are between 4 and 6 inches long, with a considerable number reaching a length of 7 to 8 inches. The small oysters were between 1½ and 2 inches long. The shells are rather thin and the oysters, at the time of examination, were in fair condition, though too fresh in flavor. There are a few mussels. These beds apparently have not been worked in recent years.

EAST POINT BED.

This heretofore unnamed bed lies about 750 yards offshore between Idlebach Flats and East Point signal. It has a length of about 850 yards and a width of 150, with an area of approximately 23 acres. It consists of a small central area composed of many dense patches

separated by soft mud and prolongations of scattering growths northwest and southeast. The denser area, which is the older part of the bed, has still no very great age, the living oysters reposing on a soft, muddy bottom in which shells can be detected with the probe for a depth of about 4 feet. The surrounding more scattered area has substantially the same character excepting that the oysters are found at wider intervals.

The oysters are extremely long and narrow and with dead shells are crowded into large clusters, which are buried for one-third to one-half their length in the soft mud. The adults average about 5 inches in length, but many of them are 6 to 7 inches long. As in other localities of this part of the bay, the clusters are covered with a dense growth of barnacles and mussels, but the oysters are fatter than are found at any point above. On the densest parts of the central area there is an average of about 48 adult oysters per square yard, but the average yield is below this. The bed is estimated to contain about 6,400 barrels.

ELEVEN MILE LUMPS.

This is a group of three dense areas near the north shore between Stump and Grass signals. They are here so called because situated about 11 miles from Matagorda. The largest and most eastward is about 325 yards long and 200 yards wide, with an estimated area of about 11 acres. The other two lying farther offshore to the westward are small bodies covering about an acre each, and are not accurately plotted on the chart. They were observed during the extremely low tides of winter, when their crests were about awash, but were not found by the hydrographic party and their importance appeared so slight that no extended search was made for them.

No detailed examination was made of the larger bed, but a cursory observation indicated that it bears a general resemblance to Grass Lump. The estimated contents are 4,700 barrels of oysters over 3 inches in diameter. The growth is dense over the greater part of all three lumps, with a more scattering growth on the margins. These are apparently all old beds. Upon the crests of the smaller lumps the oysters are small and many are killed by cold and exposure during the low tides of winter.

CREEK PATCHES.

The beds to which this name is given in this report lie along the north shore between the mouth of Live Oak Creek and Stump signal. There are five beds in the group, ranging in extent from about 2 to about 60 acres. The largest bed lies southeast of Stump signal, beginning as an exposed reef just off the mouth of a small creek and

1. MIDDLE PATCHES OYSTER. Reduced $\frac{1}{2}$.

2. OYSTERS FROM EAST POINT BED. Reduced $\frac{5}{9}$.

extending in a southeasterly direction for about 1,000 yards. At its inner end it is a dense body of small clustered oysters, but a short distance from the shore it becomes a scattering growth, gradually merging with the surrounding soft mud. The oysters are of very inferior quality. The bed next to this consists of a dense mass of dead shells near the shore, with very few marketable oysters and a scattered growth of small oysters extending upon the surrounding mud. The other beds, which are smaller, consist of a shell bank nucleus with a fringe of small scattered oysters. The Creek Patches are of practically no value commercially, and it is not known that they ever have been. The entire bight between the mouth of Live Oak Creek and Stump signal is covered with a foot of soft mud lying above a layer of shells.

DRESSING POINT SHOALS.

The oystermen give this name to a bed running down the bay for a distance of upward of a mile from Dressing Point, but in this report the designation is extended to include two newer and unnamed beds to the southward, which for convenience will be called Middle and South shoals, respectively. These beds have a combined area of about 477 acres, and it is estimated that at the time of the survey, in March, 1905, they contained about 26,000 barrels of oysters over 3 inches in length.

The original bed, long known to the residents as Dressing Point shoal, and included in what this report calls the North shoal, lies at a distance of between one-fourth and one-half mile off Dressing Point. This old reef is about 400 to 600 yards in diameter, with a depth of about 1¼ feet of water on the crest at the low-water plane adopted in this report. The south side is abrupt, the soundings jumping from 4½ feet to 2½ feet within a few yards, but the north margin slopes off gradually from the crest to a depth of 3 feet at the edge of the bed. Probings show that the deposit of shells and oysters is about 2½ feet thick, superimposed on a layer of sand and hard mud on the north side, which gradually changes to a soft, muddy bottom southward. That this part of the bed is quite old is shown by the thickness of the shell deposit, which must be the product of many years and by the circumstance that it was a well-defined shoal fifty years ago when the hydrographic survey by the Coast Survey was made.

The growth of oysters on parts of the old shoal is dense, one section examined giving an average per square yard of 100 oysters over 3 inches long and 40 of smaller size, but other sections were much less productive, especially in oysters of the larger size. From this nucleus of dense growth the north shoal stretches away in all directions, but especially to the eastward and westward, the oysters becoming

gradually more and more scattered as the margins of the bed are approached, the small patches of clusters being separated by increasing areas of the hard mud which in general forms the bottom on which the bed reposes. The southern and western limits are rather well defined by the change from hard to soft muddy bottom, but to the northward the hard mud stretches away to the shore of the bay. It is evident from the conditions obtaining here that the bed has been extended beyond the limits of the original reef by the distribution through the agency of the oystermen of shells and small oysters rejected in culling. The bed was formerly fished for the market, but was untouched during the season of the survey.

The oysters occur in clusters of 3 or 4 adults with small ones attached. The larger oysters average about 4 to 4½ inches in length, are rather thin-shelled, and more or less narrow and elongate. Nearly all clusters bear great masses of young mussels, which are rapidly overgrowing the oysters, smothering them, appropriating their food, and in general reducing them to an extremely poor and watery condition, totally unfit for market. The bed is commercially worthless in its present condition, the effect, direct and indirect, of the low salinity resulting from the closure of Mitchells cut. The density of the water at the time of the survey (March, 1905) was between 1.0037 and 1.0061. The most promising fact in connection with the bed is the preponderance of young oysters, those under 3 inches outnumbering those over that length nearly two to one, indicating that if the proper density conditions should be brought about the bed would soon recover its former productiveness. The prolific growth of mussels is evidently a recent development traceable to the low salinity.

The south and middle Dressing Point beds have areas of about 190 and 15 acres, respectively. They differ from the north bed in the fact that they have not old dense reefs as nuclei. They each consist of scattered patches of clustered oysters lying on the soft mud which forms the general bottom in this part of the bay. The growth is more sparse than on the northern bed, and all circumstances point to the conclusion that the beds are of comparatively recent origin. The oyster pilot attached to the survey stated that there were practically no oysters on either bed ten years ago. It is evident that we have here another case of the founding of a bed on rather soft muddy bottom through the medium of oysters and shells thrown overboard by the oyster boats culling on their way to market, this area lying directly in the course of vessels returning to Port Lavaca and Matagorda from the beds above Dressing Point. In this case the practice results in an extension of the natural beds, but if the mud were a little softer the oysters would be engulfed and lost. The oysters on both beds in general resemble those of the northern bed, though somewhat more elongate.

LIVE OAK BAY.

The area regarded as embraced in this region lies east of a line drawn from Dressing Point to the mouth of Live Oak Creek. It contains a proportionately large area of oyster-bearing bottom, about 228 acres in all, divided into three general groups of beds—a scattering growth interspersed with a few dense patches lying in the southern half of the bay, a rather dense bed southeast of the mouth of Live Oak Creek, and several small beds near the islet north of Dressing Island.

The largest bed, with an area of about 160 acres, covers practically the entire southeastern part of the bay and sends a long narrow tongue down between Dressing Island and the mainland. Near the center of the bay there is a small reef about 35 yards long and 20 yards wide, a large part of which is bare at low water. Here the oysters are small and poor in shape and quality, and there is a great preponderance of dead shells and shell débris. The bed is about 1 foot thick, superimposed on a substratum of soft mud about a foot deep, beneath which hard bottom is found. From this reef the bed scatters off in all directions excepting the north, the oysters improving somewhat in quality as they become fewer in numbers. In general they lie in scattered patches surrounded by soft mud, but between Dressing Island and the mainland the bottom is hard and shelly for a depth of 2 feet. In this place there is a fair growth of single oysters of good shape and from 3½ to 4 inches long, with a considerable proportion of smaller ones. The best oysters found anywhere above Dressing Point were produced in this locality, but the salinity of the water is so low that their flavor was insipid in the extreme.

The small patch north of Grassy Island, shown on the chart, is practically a dead reef or shell heap, with very few adults, but a relatively larger number of small oysters than were found in other sections examined.

The long bed running westward from Grassy Island is composed of about equal numbers of dead shells and clustered oysters about 3½ inches long, together with a considerable proportion of smaller ones. Near the island the bed is practically a shell heap. The clustered oysters are thin-shelled, long, and elliptical, and bear large numbers of mussels, whose prolific growth is smothering the oysters.

The bed south of the mouth of Live Oak Creek is a dense shelly shoal near the shore, but at its outer edge becomes more scattering. The oysters in general resemble those on the bed last described.

Live Oak Bay was formerly a more or less prolific ground for the oystermen, but the beds, in common with those in other parts of the upper bay, have been much injured by the freshness of the water since the closure of Mitchells Cut. At the time of the survey the

density ranged between 1.0018 and 1.0041. The bottom is generally composed of soft mud, with a substratum of shells almost everywhere at a depth of 6 or 8 inches, giving testimony to the former greater abundance of oysters in these waters.

BEDS ABOVE DRESSING POINT.

It is stated by persons possessed of local knowledge of the bay that, prior to the opening of Mitchells Cut, during the gale of 1875, the entire region above Dressing Point was practically devoid of oyster growth. This can well be believed from an inspection of the conditions obtaining in the winter of 1904–5, the cut having finally closed during the previous summer after a varied existence. It will be seen by reference to the chapter on "Densities" (p. 57) that the salinity was altogether too low to produce satisfactory oysters; and as the tendency in isolated bodies of water so situated is to become progressively fresher, it will not be long, if the time has not already arrived, when the salinity will become so low as actually to imperil the existence of the oysters already established there. The oysters on all of the beds about here were poor and sickly in appearance, and were evidently having a hard struggle for existence against adverse conditions. Unless a new communication with the Gulf is established, these beds will forever be worthless, even should they not be exterminated.

It is stated that until the season of 1904–5 the oysters in this part of the bay were generally of excellent quality, and Port Lavaca dealers paid $1 per barrel for them when those from Tiger Island were worth but 75 cents. All of the beds, which are discussed in more detail below, were highly productive and much frequented by the oystermen, sometimes from 400 to 500 barrels per season being taken from a half-acre patch.

Although these beds are shown on the charts each as a continuous growth of scattered oysters, in reality they consist of innumerable small patches separated by areas of soft, muddy bottom. It is stated that the original growth in this part of the bay was initiated at Browns Lump, and extended gradually down the bay. It is evident that the beds were at one time all more compact, but have become scattered and widely extended by the operations of oystering and the distribution by the oystermen of shells and cullings over the soft mud surrounding the beds, each shell or oyster thus distributed becoming a potential basis for the attachment of future generations of young.

The beds above Dressing Point, as shown on the accompanying chart, include within their limits about 395 acres. On the best parts of these beds there is an average per acre of about 70 barrels of oysters over 3 inches in length; and as it is estimated that but 15 per

cent of the area is thus productive, the total present accumulation is probably not far from 5,000 barrels of oysters above the size prescribed by law as the minimum which it is permissible to take. The average size on these beds as a whole is not much over 3½ inches. The average number of oysters per square yard on the best parts of the beds are as follows: Over 3 inches in length, 14; between 1 and 3 inches, 8; under 1 inch, —; dead, 30.

The recently dead oysters rarely measure 3½ inches in length, but those showing evidence of death at a more remote period are larger. About three-fourths of the shells are old and rotten.

The oysters are poor, the shells are thin, and there are practically no living things save oysters. On the whole, the beds are in bad condition.

Browns Lump.—This is a small bed lying off Browns Cedars, at a distance of about 400 yards from shore. It has a length of about 400 yards, a width of 250 yards, and an estimated area of 18 acres. It is stated that this was formerly a dense and much smaller body of oysters, but owing to extensive fishing in recent years and the custom of throwing culls and shells on the mud surrounding the original area this has now become transformed into a diffuse bed in which the oysters lie in scattered patches. Within recent years a thin deposit of mud has been laid down, and many of the oysters and shells have been covered, though their presence is readily detected with the sounding pole. The oysters are now few in number and inferior in shape and quality. This bed has apparently suffered severely from the closure of Mitchells Cut, but should the cut at Browns Bayou be soon opened there is good reason to expect that Browns Lump will again become productive.

Marsh Patch.—This name is given in this report to a small bed of about 9 acres of scattering oysters lying near the north shore opposite Browns Lump. The oysters are few in quantity and inferior in quality, but the new cut should improve them in both respects.

Root Lumps.—These beds lying in the middle of the bay between Brown and Smith signals have a total area of about 170 acres. They are composed of patches, which can be grouped in five general beds, varying in size from 1 to 100 acres, as shown on the chart. They are discontinuous in character, the oysters being found in small patches, each composed of a few clusters separated by soft mud. They cover a much greater area than formerly, and, like the other beds of this part of the bay, have apparently become much extended beyond their original dimensions by the custom of culling and throwing overboard the shells and small oysters on the bottom surrounding the reef. In former years, when excellent oysters were produced here, oystermen discovering the small productive patches

or lumps of which the beds consisted observed much secrecy in their operations and upon the approach of another boat withdrew to the barren areas and utilized the opportunity in culling their catch. The dead shells, together with the young oysters, when not ingulfed in the soft mud, became the nuclei to which the spat of succeeding years attached. That many of the oysters and shells gradually sank beneath the surface mud is shown by the almost universal presence of a substratum of shells easily detectable with the sounding pole. There is no doubt that under favorable conditions of density this diffusion of material suitable for cultch would eventually result in the establishment of more extensive productive beds. In former years the Root Lumps were systematically worked and produced a fair yield of good oysters. As in the case of the other beds of this region, they were unproductive during the season of 1904–5.

Ranch Patches.—This name is given to a chain of six beds lying between Ranch signal and the cut into Live Oak Bay east of Dressing Island. The area of the individual beds varies from less than 1 acre to over 50 acres, and the total acreage of the group is about 108. The general character of the beds is about the same as those constituting the Root Lumps, though there are small areas where the growth is more dense and with a greater accumulation of shells. Nearer the shore there is a substratum of hard mud upon which is superimposed a stratum of soft mud and shells, but toward the middle of the bay the bottom, to a depth of 4 to 5 feet at least, is composed entirely of soft mud and engulfed shells. The living oysters are all small, badly clustered, and of very poor quality and shape. There is a great preponderance of dead shells, many of the old ones being large, while the recently dead are of smaller size. The shells of the living oysters are thin and fragile, and the whole aspect of the beds indicates that they are far on the highway to extinction.

Off-the-Cut Lumps.—The beds so designated by the oystermen are four in number, ranging from about 4 to 115 acres in area, with a total acreage of about 160. The conditions here are practically the same as those found on the Root Lumps and the other beds in the vicinity. The beds lie on the southeast side of the bay opposite to the cut east of Dressing Island.

East Side Lump.—This is a bed with an area of about 40 acres, extending for about 350 yards along the shore of Dressing Island and projecting out into the bay for a distance of about 800 yards. It consists of a scattering growth of about the same general character as in the preceding beds. About 350 yards to the eastward there is a small lump with a dense growth forming a shoal projecting out from the island. This bed is now continuous with the scattering growth along shore, but was formerly a detached circular body of a good quality and productiveness.

1. GOVE BAYOU OYSTER. Reduced ½.

2. MAVERICK BAYOU OYSTER. Reduced ½.

SHORES AND BAYOUS.

Above Dressing Point there is a practically continuous fringe of scattering oysters along shore and in the bayous, a condition which also prevails at intervals along the south shore almost as far as Tiger Island. Excepting in the deeper bayous most of these oysters are young and lie in such shallow water as to be exposed for longer or shorter periods during the winter. At the time of the survey a large proportion of them had died, undoubtedly for lack of food and water, as the bottom on which they lay was cracked and seamed from the action of sun and wind.

Below Tiger Island there are numerous long narrow bayous, usually with muddy bottoms, penetrating the peninsula to the line of sand dunes which fringes the gulf shore. Some of these apparently contain no oysters whatever, but in Zyprian, Thompson, Gove, Big. Maverick, Boggy, Hibber, Cotton, and one or two other bayous there was found a scattering growth in the general localities indicated on the chart. In most cases these oysters were large and fat, some of them being the best found during the survey. It is understood that certain of these bayous have been planted.

OYSTER CULTURE.

NECESSITY AND GENERAL CONSIDERATIONS.

That the natural oyster beds of Matagorda Bay will not be able to produce sufficient stock to keep pace with the demands of the growing oyster industry is a proposition which hardly demands demonstration. The universal history, not only of oysters but of other natural products—of lumber, of natural gas, of land-locked fishes—shows that the belief in unlimited and exhaustless supply eventually brings disaster and the conviction, often too late, that nature's bounty must be aided by man's economy and foresight. On all parts of our coast, even in Maryland, whose waters are vastly more productive than the coast of Texas, the natural oyster beds have been more or less completely exhausted, and the only salvation from extinction of the oyster industry is recourse to planting under some scheme of private ownership.

DEMAND UPON NATURAL BEDS.

With the small business of past years the drain upon the natural beds of Matagorda Bay never would have been such as to imperil the supply, but changing conditions incident to the increasing demands of a greater population, the mulitiplication of railroads and their competition for traffic, and the depletion of formerly productive beds on other parts of the Atlantic and gulf coasts have operated

to induce a comparatively rapid expansion of the oyster industry on the shores of the bay during the past few years. Formerly Port Lavaca, being the only point having railway communication, was the sole locality in which more than a purely local oyster trade could be conducted, but the recent entry of railroads into Matagorda and Palacios has enabled those towns to become competitors. Far from detracting from the importance of Port Lavaca as an oyster center, the rise of this competition has but served to stimulate shipments from that place, with the result of a recent rapid increase in the oyster trade of the entire Matagorda region. In the season of 1904–5 there were 9 shucking establishments in actual operation on the bay. According to the report of the state oyster commission the shipments from Matagorda Bay points in 1902–3 represented 55,000 barrels, in 1903–4 94,600 barrels, and in 1904–5, according to approximate estimates obtained from the dealers, about 125,000 barrels, of unshucked oysters.

PREVIOUS OUTPUT AND POSSIBLE YIELD.

In the earlier years many of the oysters came from above Dog Island Reef, but in 1904–5 practically all came from between Dog Island and Half Moon reefs, the majority of them from the two beds named. As shown in the table on page 14, Dog Island, Forked Bayou, Shell Island, Mad Island, and Half Moon Reef are estimated to have contained at the close of the season 1904–5 about 264,000 barrels of oysters over 3 inches long, or, if the estimate be restricted to the parts of the reef which are worked, about 234,000 barrels. To arrive at the number on the workable portions of the beds at the beginning of the season, in the fall of 1904, there must be added to this about 125,000 barrels, the quantity gathered during the year, making the estimated total of about 359,000 barrels, say, in September, 1904. The oysters marketed, therefore, represented approximately 35 per cent of the total available supply of those over 3 inches long, although of course a considerable proportion of the latter were too small for the trade.

Numerous detailed examinations of the workable areas of the beds show that the oysters under 3 inches were numerically to those over that length in the proportion of about 68 to 100 at the close of the season. Assuming that practically all of these small oysters survive and that they will grow to an average marketable size within one year, which is a rapid rate of growth, there would be added to the available supply of oysters for the season 1905–6 about 159,000 barrels, or, allowing a mortality of 25 per cent during the year, about 120,000 barrels. If the conditions at the time of the survey were normal and the annual supply of spat in succeeding years were to be

equal to that which had set in each of the two years preceding, the catch during the season 1904–5, estimated at 125,000 barrels, must be approximately the maximum allowable for all the beds between Dog Island and Half Moon light. Any greater demands upon the beds would speedily exhaust them, and in the face of unfavorable conditions even this draft can not be maintained upon any of the beds in question.

The best parts of Half Moon Reef, which supplied an important part of the yield for 1904–5, are already practically exhausted, and even with a heavy set of spat during the summer of 1905, which is by no means certain, can not hold their own again for several years to come. The other beds are in their turn likely to meet with the same conditions. As has been stated before in this report, the beds above Dog Island Reef were relatively of little economic value at the time of the survey, owing to the freshness of the water. They yielded practically, if not absolutely, nothing during the season, but are estimated to have contained at that time about 181,000 barrels of oysters over 3 inches long. The small oysters were numerically to those over 3 inches long in the proportion of 175 to 100, the great preponderance of them being on Dressing Point shoal, Middle Lump, Raymond Landing Shoals, Boiler Bayou Reef, and Spring Bayou Reef. From the fact that they were mainly on old dense beds it is not improbable that many of them were old oysters stunted by reason of their crowded condition, though it is true that the set of spat on some of the beds has been heavy in recent years, and the character and condition of the oysters, as well as the productiveness of the beds, would undoubtedly be improved if the beds were worked.

On account of their poor quality and freshness most of these oysters were during the survey unfit for the raw trade, but many of them would be utilized by canneries. Owing to the mixed character of the clusters and the difficulty in culling off the small oysters, a very large proportion of the latter would necessarily be destroyed if the beds were worked, especially if the stock were steamed. The oysters of Raymond Landing Shoals in their present condition could not be used except for canning, and as this bed contains numerically about half of all the young oysters above Dog Island Reef, the destruction for several years at least would necessarily be enormous. Taking everything into consideration, it is doubtful whether the beds in the upper bay could produce more than 75,000 barrels of oysters per annum for a term of years, even were the density conditions to be so modified as to become much more favorable than at present. A single large cannery could consume the entire output.

A consideration of the above facts shows that under fair conditions as understood on the gulf coast, and with the wisest possible

administration of the culling laws, the potential annual product of all the natural beds above Half Moon Reef can not be expected to exceed for a term of years about 200,000 barrels of marketable oysters. For a time the catch may be in excess of this and there will be occasional years of exceptional plenty, but, on the other hand, the same beds must be expected to have lean years or even periods of barrenness, such as have in the past periodically visited Half Moon Reef and some of its neighbors; or there may be physical disasters, such as overwhelmed Mad Island Reef about 1896. The more closely the potential limit of production is approached, the greater is the likelihood of disaster should the conditions at any time become unfavorable.

Owing to the complexity and fortuitous character of the factors that have to be taken into consideration, the foregoing estimates and the conclusions drawn from them must of course be regarded not as absolute but as mere approximations. The correctness of the general trend of their testimony, however, can not be disputed, and it is the unmistakable conclusion that if the oyster industry of Matagorda Bay is to have its legitimate development it must be based on a supply of raw material less precarious and less subject to promiscuous demand than that from the natural beds. If others hesitate to embark in the industry, the dealers and packers themselves must, for their own protection, blaze the way and if necessary plant areas sufficient to insure the future of their own business. Resort to oyster culture is inevitable, and it is proper, therefore, to discuss the chief local, physical, and biological considerations that apply and the degree to which these conditions are filled in Matagorda Bay.

OYSTER LAWS AND PUBLIC SENTIMENT.

SYNOPSIS OF EXISTING LAWS.

Under the legislation in force July 1, 1905, the enforcement of the oyster laws of Texas is intrusted to the fish and oyster commissioner, who is assisted by a number of deputies, the same persons being the agents of the state in the execution of laws relating to the other public fisheries. A special tax of 2 cents per barrel is levied (Revised Statutes, ch. 4, title 48, art. 2514) on all oysters taken from the waters of the state, whether from natural reefs or private beds, "*Provided*, That oysters taken from any waters for bedding purposes shall not be subject to this tax until again taken up for sale or shipment."

Each boat engaged in oystering for market is required (art. 2518k) to procure from the commissioner a license of prescribed form, paying a fee of $1 for each person employed thereon. Persons engaged

in oystering for market independently of a licensed vessel are required to take out individual licenses under a fee of $1 each.

A natural bed is "declared to exist when as many as five barrels of oysters may be found therein within 2,500 square feet of any position of said reef or bed" (art. 2518l).

Any citizen of the United States or corporation incorporated in the state of Texas has the right to obtain a location, not exceeding an area of 640 acres, for purposes of oyster culture, by making a written application, with a deposit of $10, to the fish and oyster commissioner. No natural bed as above defined is subject to location, and the commissioner is required to examine all proposed locations to determine whether they comply with the law. The methods of survey, marking, and the filing of records of the same are prescribed. The locator is required to pay "for the survey, plat, and all expenses connected therewith," and, in addition, he "shall pay to the fish and oyster commissioner or his deputy a fee of $10 for every 50 acres or fractional part thereof for the examination of the location, including the certificate" of description. Locators complying with all requirements of law are protected against trespass as freeholders are protected in their rights. (Art. 2518m, as amended, and 2518p.)

The owners of private locations are required to maintain the permanent shore marks, and are given the right to fence or stake their claims, subject to navigation laws. The rental or tax for the first year or fraction thereof to January 1 following is 15 cents per acre; for the next four years, 25 cents per acre per annum, and for each year thereafter, $1 per acre, the first payment being due on receipt of the certificate of location and subsequent payments on the 1st day of January of each year. Nonpayment of the rental before March 1 of any year forfeits all right to the location, which reverts to the state. (Art. 2518n, as amended.)

Under special permit from the commissioner, applicants may be empowered to gather by tongs, rakes, hand, or dredges from specifically designated and defined beds unculled oysters for planting on private locations, provided the beds designated have furnished no marketable oysters for two years preceding. The applicant is required to pay a fee of $5, all expenses of locating and examining the designated reef, and a further sum of 1 cent per bushel if the seed oysters be gathered by dredges or rakes. The usual license is required if they are gathered by tongs or hand. The catch is limited in any one season to not over three-fourths of the contents of the bed. (Art. 2518q, as amended.)

Under the penal code of the state, penalties are provided for infractions of the foregoing: for taking oysters between April 30 and September 1, excepting in certain parts of Laguna Madre; for failure

to cull and return to the beds alive oysters $2\frac{1}{2}$ inches long or less and all dead shells; for planting oysters during the closed season stated above; for the theft of oysters from private beds; for removing or injuring marks designating private beds; and for using rakes or dredges on the public beds or natural reefs.

DISCUSSION OF EXISTING LAWS.

The laws as published under the authority of the fish and oyster commissioner of Texas in 1905, of which laws the foregoing is a brief digest, are in the main salutary, though there are some inconsistencies and duplications and several important omissions. The former are probably more apparent than real and may represent defects of compilation rather than of the laws themselves.

The law provides no definite method of securing a review of the acts of the commissioner, a matter which the experience of other states has shown to be of considerable importance.

When the necessity arises for the examination of considerable areas of the bottom in the location of the proposed leases, it may easily occur that natural beds may inadvertently be included in the survey. Unless such matters can be brought to an immediate issue and adjudicated authoritatively ill feeling is engendered and a natural prejudice excited against the whole scheme of oyster culture under private ownership. The natural-bed oysterman will feel that he has been defrauded and that public fisheries are gratuitously transferred to private interests, and the belief may be held not the less tenaciously though it be unfounded. Public sentiment favorably inclined toward the more or less novel experiment of oyster culture in any given locality is an important element of success in developing the oyster resources of a state, and all measures tending to remove sources of misunderstanding and irritation should be given effect.

Another source of possible conflict lies in the failure of the laws to require the proper marking of the oyster claims. It is true that permanent marks are required to be maintained on shore, but there is no provision compelling the maintenance, under penalty, of such stakes and buoys as will plainly delimit the boundaries of the beds, and there is danger of constantly recurring disputes. On a number of planted areas examined during the survey there was nothing to indicate that they were other than scattering beds of wild oysters, and they were recognized as private claims solely from the statements of persons familiar with the locality. If a penalty is to be imposed for removing oysters from leased bottoms, it is surely but just and proper that the public should have some means of clearly knowing where such leaseholds are located.

The laws do not provide a definite term for the leases, and pre-

sumably these are to be held as perpetual during compliance of the lessee with the several provisions of the law. In that case they must also be held, presumably, as transferable and heritable, but the law does not provide, except inferentially (art. 529t), for the inheritance, sale, or transmittal of title. It prohibits the leasing or holding by any one person, firm, or corporation of a greater area than 640 acres, but what would become of a tract inherited by one already possessed of the maximum acreage? An oyster claim is not of such a nature that it could be disposed of at once, and the oysters on it could probably not all be marketed with advantage and justice to the owner within two years. Some provision should be made for the protection of the rights and equity of an inheritor, and all transfers, whether by sale, assignment, or inheritance, should be made a matter of record. Provision should be made also for filing the plat of survey, or an attested copy thereof, with the copy of the original lease or certificate in the office of record.

The provision of the law for the issuance of permits to take oysters for planting purposes from reefs overcrowded with unmarketable stock is a most excellent one. These beds, by virtue of their excessive production, would in all probability never afford good marketable oysters if left under purely natural conditions, and the removal of a portion of their contents would not only save those removed, but would permit such readjustment of growth among the residue as to develop their latent possibilities and convert them into stock of value. The only danger lies in removing more than the permitted proportion of the product and exterminating the beds by sweeping them clean of both oysters and shells. This is purely a matter of inspection, fair dealing, and judgment.

ATTITUDE OF THE PUBLIC TOWARD OYSTER CULTURE.

A number of areas in Matagorda Bay have been leased for oyster culture, but very little serious work had been done on them at the time of the survey, although, except some murmuring among the natural-bed oystermen, there was apparently no real opposition to the principle of oyster culture under private ownership. The objections heard touched mainly some features of the laws which are criticised above, namely, the inclusion of natural beds within the grants, and the failure of the leaseholders to maintain proper marks to designate the boundaries of their locations. As to the justice of the first claim the survey had no means of judging nor any legitimate concern other than the desire to offer such advice as might tend to assuage any feeling of resentment toward the laws. From the observations made, however, it does not appear that the sentiment among the oystermen is of a nature to prompt active opposition to oyster culture such

as has been encountered in some other states, and every effort should be made to discount such opposition by opening avenues for obtaining redress for persons aggrieved or supposing themselves to be aggrieved. For that reason the changes of law suggested above are earnestly advised.

That the men who earn their living on the natural beds have nothing to fear and much to gain from the development of oyster culture is shown by the facts in every state in which the industry has been established. Many former oystermen in northern states by taking advantage of their opportunities have become prosperous oyster planters, with an assured business taking the place of their previous precarious calling. Even where, for want of enterprise or for reasons beyond their control, they have allowed the opportunity for independence to pass neglected, they are able to find steady employment on the planted beds in lieu of the uncertainty of labor on semiexhausted natural beds; and finally, for those having neither the desire nor the means to engage in planting for themselves, nor the inclination to enter the service of others, extensive oyster planting tends to assure the recuperation and perpetuation of the natural beds by creating a safety valve which relieves the pressure on the latter whenever their productiveness is reduced to a state imperiling their existence. There may be cited at least one instance where a large productive oyster field was absolutely and permanently depleted and ruined by private greed and the supposed necessities of business, a state of affairs that could never have been encompassed had there been extensive planted beds in the vicinity to keep up the supply of spat when the natural spawners were carried away.

PHYSICAL AND BIOLOGICAL CONDITIONS OF OYSTER GROWTH.

BOTTOMS AND DEPTHS.

In any region naturally producing oysters the matter of the character of the bottom is usually that receiving first consideration when the question of oyster culture is taken up. Other conditions—food and density, for instance—are generally, though not always, more uniform over considerable areas, and the fact that oysters of good quality are produced on neighboring natural beds is in general sufficient guaranty that these conditions are favorable. The bottom, however, may exhibit marked diversity of characteristics within comparatively narrow boundaries.

The mere fact that oysters grow on one area but not on another adjoining it does not indicate that the two presented any original differences of moment. Pure accident may determine that one shall become productive while the other remains barren. For instance, there is a small oyster lump off Crab Bayou, the position of

which is conditioned by the accident that the schooner *Kate Ward* was wrecked there several years ago and her hull furnished the one requisite previously lacking, a solid support for the attachment of the multitude of swimming oyster fry which annually throng the surrounding water. So with every oyster bed in the bay to-day, the substratum on which it lies differs probably not at all from the surrounding bottom, as was proved in the case of many of them by the investigation carried on by the survey. It is apparent, therefore, that the absence of oysters on a given area is not an evidence of its inherent lack of adaptation to oyster culture. A further investigation is necessary to determine the facts.

In this survey the quality of the bottom was determined by means of the sounding pole at upward of 100,000 places in all parts of the bay, and in many localities this was supplemented by probings to determine the character of the substratum. These examinations disclosed a marked uniformity of the distribution of the bottom materials.

Along the northwestern shore there is, except in the vicinity of the mouth of the Colorado, a narrow fringe of hard mud, the original bottom left by the erosion of the prairie loam as the shores gradually receded under the action of the waves. A large part of this bottom is bare for long periods during the winter. Off the mouth of Live Oak Bay the belt of hard mud is much wider than elsewhere, reaching from the north shore well on to the large oyster bed in the middle of the bay off Dressing Point. On the southeastern side there is a corresponding but generally wider strip of sand washed from the shores and drifted by the winds which sweep across the peninsula from the sand hills on the Gulf. In many places the sand is compact and apparently stable, but often it tends to shift and undoubtedly close to the shore line it is all liable to be seriously disturbed under the influence of the heavy gales which sometimes visit the Gulf coast. Forked Bayou Reef lies just beyond the edge of this sand in comparatively deep water, yet it is stated, and the physical evidence gathered by the survey tends to substantiate the claim, that during the extraordinary gale of 1875 this bed was partially overwhelmed by sand swept upon it by the waves. This was an unusually violent gale, however, and in general it may be stated that the outer edge of the sand zone, where it lies as a thin stratum on the subjacent mud, is comparatively stable. This is particularly the case where the sand belt is broad, as on the Idlebach Flats or generally below Tiger Island, where its edge meets the mud at a depth of 5 or 6 feet. Between the two strips above described, one on each shore, the entire bottom of the bay, save on the natural beds, is composed of a deposit of moderately soft mud of considerable depth, though in places in the upper bay

there is a substratum of shells, indicating the location of old engulfed oyster beds. This soft mud is of sedimentary origin, the accumulation of deposits of silt brought down by the fresh-water streams.

Though varying somewhat in consistency, it is believed that practically all of this bottom, especially below Tiger Island, can be utilized, with little or no preparation, for purposes of oyster culture. Shells spread upon it will sink to some extent, but most of them will remain sufficiently exposed to furnish bases for the attachment of spat, and each year that the bottom is used will witness an improvement in its hardness through the added accumulations of shells. That this is not a wholly untried experiment in Matagorda Bay is evidenced by the formation of the scattering beds of oysters about and above Dressing Point, which, as has been shown in preceding pages, have been produced by a species of unintentional oyster culture—the deposit on the soft mud of culls and shells thrown overboard from boats en route to market from beds lying farther up. Local witnesses state that the great scattering growth shown on the chart north of East Point signal lies upon what was nothing but barren mud ten years ago. What has thus been done with foul material and without intention can undoubtedly be duplicated and improved upon by well-considered and systematic planting with clean shells, of which an abundant supply lies about every oyster house.

Probably the best bottom in the bay so far as natural texture is concerned lies along the edge of the sand strip between Snapper Bank and Crane signal, in a depth of from 3 to 6 or 7 feet of water at winter low tide. Here there is a thin surface of sand resting upon the mud, each material imparting some stability to the other. This condition can be readily produced artificially in a great many parts of the bay by spreading a thin layer of sand over the muddy bottom, where it will rest and serve as a good support for shells and oysters deposited on it. Many bayous on the south shore below Tiger Island run well up to the foot of the dunes along the gulf shore, where at high water sand could be loaded upon scows and transported to adjacent bottom at comparatively small expense. Some of the bayous themselves could be used incidentally for fattening grounds.

The hard mud bottom on the north shore is too narrow to be of much value to the oyster culturist, and moreover the water here is so shallow that a large part of the bottom is much exposed during the winter. The sand strip in the upper bay is wider, but it, too, in considerable part, lies in shallow water, and moreover there are other objections to planting there, as will be seen in succeeding sections of this report. The soft mud bottom is all found in a depth which would keep planted oysters covered at all times. Above Dog Island

Reef the water ranges from 1 to 5 feet, being somewhat more shallow close to the reef than farther up the bay. Below Dog Island the depth gradually increases to the maximum of 14 feet at the lower limit of the survey.

TIDES.

At the time of the hydrographic survey of Matagorda Bay by the Coast and Geodetic Survey no bench marks of a permanent nature were erected, and for the present work it became necessary to establish a new plane of reference. Matagorda was selected as the most central and convenient locality, and a plain staff, reading from 0 to 6 feet, graduated in tenths, was fixed to a pile on the wharf of Mr. Carr's oyster house at that place. The staff was protected on three sides by boards 10 inches wide driven into the bottom at right angles to one another and nailed. At the end of the season's work a bench mark was established by driving a three-fourths-inch galvanized iron pipe 10 feet long into the bottom close alongside the tide gage, with its top coinciding with the reading of 1.5 feet on the tide gage, the plane of reference adopted in this survey. This plane of reference is the average of 31 low waters, from January 20 to February 19, inclusive, and may be taken as the average low water in the height of the oyster season. At this stage of the tide the crests of Dog Island, Shell Island, and Mad Island reefs are exposed, and there is less than a foot of water on the highest parts of Half Moon Reef. For the purposes of this survey it was not deemed necessary to establish secondary gages, for while it was recognized that the barrier of Dog Island Reef would produce relative diversity in the levels in the upper and lower bay, the average error was comparatively slight and insufficient to have practical bearing upon the subjects herein discussed.

Owing to the remote and constricted connection with the gulf, the tides in the part of the bay covered by this report are largely independent of lunar influence, and it frequently happens that the water level remains stationary throughout the day. The average diurnal range during the period of tidal observations, from January 20 to May 11, inclusive, was less than 2¼ inches, and the maximum change during twenty-four hours was 1.1 feet, from gage reading 2.2 feet at noon February 18, to gage reading 1.1 feet at 8 a. m. February 19.

The height of these tides is generally dependent upon the direction and velocity of the winds, southerly and westerly winds rolling up the water above Half Moon Reef, and northerly and easterly winds driving it out. In consequence of this, during the oyster season, when there is a prevalence of wintry northers, the tides are in general at their lowest, increasing in height as the spring advances and southerly and southwesterly winds gain the ascendency. This is

shown in the following table, the height being recorded in feet above or below the plane of reference:

Date.	Average low tide.	Average high tide.	Lowest tide.	Highest tide.
1905.	*Feet.*	*Feet.*	*Feet.*	*Feet.*
January	0.00	+0.15	−0.4	+0.4
February	+0.11	+0.28	−0.4	+0.7
March	+0.64	+0.78	+0.2	+1.4
April	+0.92	+1.15	+0.4	+1.7
May	+1.43	+1.65	+1.0	+2.1

A curve showing the daily mean tide at the gage from January 20 to May 7, inclusive, is shown on plate x, facing page 60.

Upon this question of the tides three important factors in oyster production are dependent, namely, the production of currents, the regulation of the density, and the exposure of the bottom. The first two will be treated hereafter under their appropriate heads, but the latter can properly be considered here.

It is a matter of common knowledge that in many places, especially in the South, oysters are subject to daily exposure to the air, and apparently suffer but little or not at all in consequence. When the tide leaves them they close their shells, and retain within them sufficient fluid to sustain the vital functions until they are again covered, and this conservation of the necessary fluids can be sustained for several weeks or, under some conditions, for months. Eventually, however, in cases of prolonged exposure, the muscle closing the shell must relax from sheer fatigue, the fluid escapes, and the animal dies, as can be seen on examination of the shores and reef crests of the bay.

An inspection of the accompanying chart will show a fringe of scattering oysters along practically the entire southeastern shore of the bay above Tiger Island, and on the northwest shore above Stump signal. During the summer months, when the tides are high, the minute swimming fry derived from the spawning oysters in the vicinity are carried by the currents into the shore waters, where they settle down and attach to the shells and other firm bodies there found. For some months after their attachment their environment remains favorable and they flourish and grow, but with the advent of winter the tides gradually drop away and they are left for longer and longer periods exposed to the air and sun. Many of them have set in water so shallow that they are left bare for a large part of December, January, and February, when the tides are at their lowest; the bottom on which they lie becomes seamed and cracked from the effects of sun and wind, the oysters sicken, relax, and eventually die. During March and April, when the scattering shore growths of the upper bay were examined by the survey, a very large proportion of the oysters were dead or dying; few, if any, were of sufficient size for

market, and none were fat. It is probable that, were it not for the long periods of low water and the consequent mortality, a very considerable proportion of the shores of the upper bay would be fringed by a dense growth of oysters instead of the sparse growth now existent. The same causes operate to restrict or inhibit the production of marketable oysters on the crests of the reefs of the lower bay.

Even in those cases in which oysters have set in water deep enough to insure them against more than temporary exposure they are placed under conditions unfavorable as compared with those surrounding their fellows that are never exposed. They can feed only when covered by the tide, and the more constant this covering the greater the opportunity to obtain an abundant supply of food. In waters richly laden with the minute plants on which they feed it may be possible for them to obtain in a few hours daily all the nutriment required for growth and fattening, but in less fertile waters the entire twenty-four hours may be none too long.

With equality in other conditions, therefore, those oysters which are constantly covered have advantages over those subject to exposure, and notwithstanding the good character of the bottom in the shoaler waters of the upper bay, oyster culture could not be undertaken there with any prospect of success for precisely the same reasons that have militated against the establishment there of permanent natural beds. The prospective oyster culturist of Matagorda Bay must seek some location in which the bottom is not exposed during the low tides prevailing in winter. That such locations, presenting the other desirable features also, are not hard to find will be shown in the further discussion.

CURRENTS.

In the original scheme of the survey it was contemplated to make systematic observations on the direction and velocity of the currents in various parts of the bay, but upon arrival on the ground it was speedily appreciated that from the nature of the local conditions such observations would have but little value, and no definite data could be presented. Currents in bays and estuaries in general are mainly conditioned by the tides, which in most regions have sufficient regularity to establish well-marked and definite currents for each phase of lunar influence, and for any given stage of the tide there is a corresponding current constant in direction and within certain limits more or less constant in velocity and duration. In Chesapeake Bay, for instance, the Coast Survey is enabled to furnish data showing the direction and average velocity of the currents for any given point and stage of the tide, but in the portion of Matagorda Bay covered by the present survey such predictions are absolutely impossible, owing to

the tidal irregularities noted in the preceding chapter, and any observation made would have been applicable to the time of observation solely. It was considered, therefore, in view of the multiplicity of factors requiring investigation, that the time necessary for this work could be more profitably devoted to other fields.

Though lunar influence is felt to a slight extent through the connection of the bay with the gulf at Pass Cavallo, for all practical purposes the tides, and therefore the currents, are under the domination of meteorological conditions. Northeast winds set up currents running down the bay and southwest winds produce the opposite effect, and the velocity depends largely upon the velocity of the wind. On calm days the set and strength of the currents is conditioned by the direction and velocity of the wind on preceding days; in other words, upon the character of the movement requisite to establish an equilibrium of level between the different parts of the bay. During calms after northeasters the set of current is toward the head of the bay, after southwesters toward the mouth. Another meteorological factor which affects the water level, and therefore the currents, is the amount of rainfall and the discharge into the upper bay through the Colorado River, Caney Creek, and smaller streams. When the discharge is heavy there is a general set toward the mouth of the bay, and this may continue even while the tide is rising, a common feature of tidal phenomena in estuaries. Owing to the small average diurnal change of water level, as shown by the daily observations, the currents in the bay are necessarily weak, excepting in the channels through Dog Island Reef, where there is usually a strong flow, often in one direction for several days in succession. On most of the oyster beds of the Atlantic coast the tidal change is between 2 and 6 feet twice daily, and it will be at once seen that the currents must be of much greater velocity than in Matagorda Bay, where there is an average diurnal change of less than 2⅓ inches in the entire twenty-four hours and frequently no change at all. In the Chesapeake Bay oyster region, where the tide ranges from 1¼ to 2½ feet in average height, there is a maximum current of from 0.4 to 1.5 knots, according to locality, four times each day, and the slack water at any time is of short duration. At Cherrystone Light the average daily current is 0.9 knot, and it is at almost that velocity within an hour of slack water, either flood or ebb.

The importance of these currents to the oyster industry is considerable. They scour and keep clean the shells or other material offering surfaces for the attachment of spat; they distribute widely the minute swimming embryos or fry and make possible a set of spat in places distant from the location of the parent oysters, and, finally, they bring constantly renewed supplies of food-laden water within the influence of the weak currents which the oyster itself produces

when feeding—all vital considerations to the oyster culturist. Unless it be kept clean of even thin deposits of sediment and slime, which would stifle the tiny oyster when it settles down, the material deposited for the purpose of obtaining a set of spat is soon rendered useless and the planter loses both his material and the labor involved in distributing it. If there be no currents to waft the tiny oyster fry from the neighboring natural or planted beds of spawning oysters it is necessary to distribute brood oysters with the cultch, which entails additional expense while the chance of obtaining a good strike is materially reduced. And finally, unless they be enormously laden with food organisms, as in the artificial inclosures or claires used by the French, dead or slack waters will not produce fat oysters.

Excepting the reef channels and taking all factors into consideration, the currents are most constant and strongest in that portion of the bay lying along the peninsula shore below Tiger Island. In the upper part of the bay the free ebb and flow of the lunar tides is retarded more or less by the barrier of Dog Island Reef, but below Tiger Island they have unrestricted sweep in the deeper water of the southeastern side of the bay, while they are impeded on the opposite side by shoaler water and the projecting reefs. The same factors operate to promote in the same locality a freer circulation of the water under the influence of the winds, and finally all of the water derived from the streams, the major portion of which is discharged just above Dog Island, finds its way to the sea through the lower bay mainly along the peninsula shore, toward which it is deflected by Dog Island and Shell Island reefs. So far, therefore, as one may be influenced by the important matter of currents, the choice of location for oyster culture will be directed toward this part of the bay, for here flows not only most of the water passing from the sea to the upper bay, and of the still heavier discharge from the upper bay toward the sea, but also such movements as operate to raise or depress the level locally below Dog Island Reef, whether under lunar or meteorological influence. Other factors being equal, the advantages in the matter of current velocities are decisive.

TEMPERATURE.

Two series of water-temperature observations were made during the survey, one consisting of tridaily records at the anchorage of the *Fish Hawk*, beginning January 1, 1905, and ending May 12, 1905, and the other consisting of 120 observations scattered at more or less uniform intervals, both in time and space, over the entire bay above Half Moon Light, between March 4 and April 28, 1905. In all cases these readings represent the temperature of the water at a distance of 14 inches from the bottom, irrespective of depth.

The observations made at the *Fish Hawk* anchorage in 8 feet of water off Three Mounds signal give the results shown in the following tables:

Date.	Average temperature.	Date.	Average temperature.
	Degrees.		*Degrees.*
January 1-15, inclusive	52.9	March 16-31, inclusive	68.2
January 16-31, inclusive	51.8	April 1-15, inclusive	71.2
February 1-14, inclusive	45.5	April 16-30, inclusive	73.4
February 15-28, inclusive	47.3	May 1-11, inclusive	77.2
March 1-15, inclusive	60.3		

Month.	Number of days on which temperature was between—					Days observed.
	30-40.	40-50.	50-60.	60-70.	70-80.	
1905.						
January	1	10	20			31
February	3	22	3			28
March		10	17	4		31
April				5	25	30
May 1-11					11	11

The temperature observations at large in the bay, owing to the exigencies of the work and weather, were not made with sufficient regularity and system to be readily digested, their main purpose being the correction of the densities shown on the chart. A comparison with the corresponding day's observations on the *Fish Hawk* shows a general agreement within one or two degrees, excepting, as might be expected, that the shoal water warmed more rapidly with the advance of spring. During the winter, which was an unusually severe one, the temperature dropped on several days below the freezing point, but on the whole the operations of oystering were not nearly so much interfered with as they are every year on the oyster beds of Chesapeake Bay and northward. In this respect the oyster fields of Texas and other localities on the gulf coast have a distinct advantage over those of the Atlantic coast.

The prime importance of the temperature of the water lies in its relation to spawning and the spawning season. The oyster, as is shown by the writer's observations on various parts of the gulf and Atlantic coasts, does not begin to spawn until the temperature of the surrounding water reaches about 70° F. An inspection of the table will show that this average temperature was not reached until April, and it was past the middle of that month when it rose permanently above 70°; before then there were occasional periods when it fell for a day or two below that point. During the winter particularly the changes of temperature, even at a depth of 8 feet, were sudden. From 8 a. m. February 12 to 8 a. m. February 14 the temperature fell from 48° F. to 32° F., a decrease of 16° in forty-eight hours, and from 8 a. m January 12 to 8 a. m. January 15 it fell 18°, from 59° to

41 . After March 1 the changes were more equable, a factor favorable to the young oyster fry, which appear to be peculiarly susceptible to the influences of sudden transitions. There are no records available which show what the late spring and summer temperatures may be, but it can be assumed that after the middle of April the temperatures everywhere in the bay are above the minimum required for spawning, and that there are few, if any, sudden changes such as kill large numbers of the oyster fry and interfere with spawning on some of the beds of the North Atlantic coast.

DENSITIES OF WATER.

By the density of the water is meant its specific gravity or the weight of a given quantity, as compared with the weight of the same quantity of pure fresh water. If the weight of the latter be considered as 1.000, that of salt water from the open sea will be about 1.0260, and the water on the oyster beds will be somewhere between these two, as oysters live only in brackish waters and eventually die if placed in water either too salt or too fresh. Aside from the question of the very existence of the oyster the matter of density or salinity influences the flavor, stock taken from the fresher waters being insipid or even repugnant to many palates, while very salt water produces a briny flavor equally objectionable.

Two series of density observations were made during the survey, one on the *Fish Hawk* in connection with the temperature observations from January 1 to May 7, inclusive, and the other by the field party as the work progressed from the head of the bay downward. The latter, which, like the other series, have been corrected for temperature, are shown in red figures in their appropriate positions on the chart, together with the date upon which the observation was made. As was to be expected, the water in the upper parts of the bay has a very low density. The Colorado River, Caney Creek, and several smaller streams flow into this part of the bay and at times discharge large volumes of fresh water, and there is a considerable influx at all times. This fresh water has no means of egress from the bay excepting at Pass Cavallo, about 30 miles below Matagorda, and, moreover, its escape is very materially retarded by Dog Island Reef, which with the exception of several small channels forms a complete barrier across the bay, with its crest awash at low water, just below the mouth of the Colorado. Formerly, as already stated, a channel, Mitchells Cut, afforded a connection of fluctuating breadth and depth between the extreme upper part of the bay and the gulf, but in the summer of 1904, after many oscillations dating from the time of its formation about 1875, this cut finally closed. It is apparent that during the existence of the opening the density conditions in the upper bay must have been quite different from those obtaining during the survey. It

furnished an avenue of escape for the fresh water discharged by the streams and a means of ingress for salt water from the gulf, and the two agencies operating toward the same end must inevitably have produced a salinity considerably higher than that found by the survey. That this is true is indicated by the former presence of good oysters above Dressing Point, where they could not be produced under the conditions existing during the winter of 1904–5.

During March and until April 12 the highest density observed above Dog Island Reef was 1.0061 on March 22, and most of the readings were below 1.0030. This was during a time when the observations made below Dog Island Reef on the *Fish Hawk* averaged about 1.0140. Above Dressing Point on several occasions the water was perfectly fresh and at no time between March 1 and March 21 did it rise above 1.0056 and the average was but 1.0020. This part of the bay is of course especially affected by the closure of Mitchells Cut. The observed density is entirely too low for the production of good oysters, and as during times of heavy rainfall in the drainage basin of the Colorado it undoubtedly falls for considerable periods below the average density of March there is no doubt that many of the beds will eventually be decimated or utterly destroyed unless from either natural or artificial agencies there occurs some change in the topography which will reestablish connection with the gulf.

During the spring of 1905 this condition was made manifest to those interested in the oyster industry at Matagorda, and a private subscription was made to defray the expenses of opening a new cut. Considerable work was done in deepening Browns Bayou (just below Brown signal) and this channel was extended artificially almost to the gulf shore. The position of this canal is shown on the chart. It was planned to make the final opening into the Gulf at a time of very high tide in the bay, so as to take advantage of the scouring action of a strong outward flow to carry the excavated sand away from the bay, but at the time the survey party left (May 12) no such opportunity had occurred. Undoubtedly this cut if completed and maintained will have a beneficial effect, and should considerably increase the density of the water in the upper part of the bay and reestablish the oyster beds of the region upon their former productive basis. It is doubtful, however, owing to the shifting sands of the gulf littoral, whether the cut can be maintained in effective cross section without more or less frequent excavation. A jetty or revetment extending to moderately deep water in the gulf would doubtless be most beneficial, but such work is expensive and it is uncertain whether it would be warranted by the results. At all events, however, the establishment of oyster culture and the existence of productive natural beds in the upper waters of Mata-

gorda Bay depend upon the maintenance of some considerable connection between the gulf and the bay in that region. The present low salinity is absolutely prohibitive of the production of marketable oysters.

Between Dressing Point and Raymond Landing Shoals the bay, from the standpoint of density, may be divided into two portions by a line running through the middle. Northwest of this line the average density between March 20 and April 6 was 1.0030 and southeast of the line during the same period the average was 1.0048, over 50 per cent higher. As this was at a time when the standard observations on the *Fish Hawk* showed a marked decline of 50 or 60 degrees, it is not improbable, though by no means certain, that earlier in the season, during January, February, and the first half of March, the water on the southeast side of the bay had a density of at least about 1.0060 or 1.0070, quite sufficient for the production of marketable oysters, though not oysters of the best quality as regards flavor.

Between the uppermost of the Raymond Landing Shoals and Dog Island Reef there was the same difference between the two sides of the bay from April 7 to April 12, when the local observations were made, the average density of the northwest half of the bay being 1.0012 and that along the southeast shore 1.0038. These observations were made at a time when the general salinity of the bay was low, as is shown by the *Fish Hawk* observations, and what has been said in regard to probable higher salinity earlier in the season above Raymond Landing Shoals is equally applicable here. Proximity to the discharge from the Colorado River, however, must always keep the density unsuitably low on the northwest shore. There never have been any oysters there and there never will be so long as the mouth of the river maintains its present position.

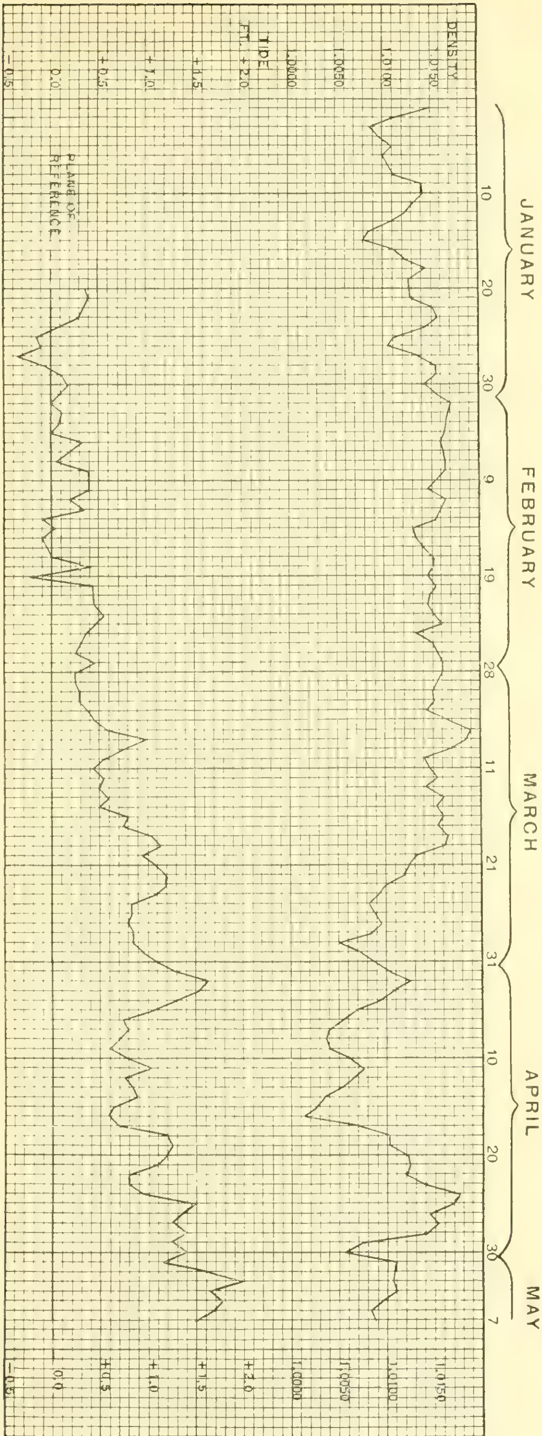
Below Dog Island it is convenient for the purposes of consideration of the densities to divide the bay into three longitudinal zones, one near each shore and the other in the middle. When the depth exceeds 5 or 6 feet there is almost invariably a difference in density between the bottom and surface strata, the fresher water from streams and rainfall tending to float above the more saline water coming in from the sea. As the survey's observations were all made at a fixed distance of about 14 inches above the bottom, it follows that the water specimens from the shallow water alongshore were taken at a point much nearer the surface than those made in the middle of the bay.

In the region between Dog Island and Mad Island reefs the average densities for the northwest shore, middle, and southeast shore were 1.0024, 1.0078, and 1.0094, respectively. These readings show the influence of the discharge from the Colorado, which, passing mainly through Dog Island channel, near the northern end of the reef, tends to lower the densities in the northwest and middle zones.

The tendency of the strongest upward currents carrying the water from the gulf to hug the peninsula shore also operates to produce a higher density in that part of the bay. As the densities taken by the *Fish Hawk* at this time were about 50° below the normal established by the series, it is probable that the averages for the months of January, February, March, and April in this region were from 30° to 40° higher than above indicated. Below Mad Island Reef the fresh water discharged through Dog Island channel having been deflected southward by two long projecting barriers of oysters extending from the northwest and commingled by currents and wave action with the denser waters from the lower part of the bay, the disparity in density between the two shores is much less marked, the respective averages of the three zones, beginning at the northwest shore, being 1.0140, 1.0168, and 1.0163. These readings were obtained between April 22 and 28, and as the *Fish Hawk* observations were then about 10° above the established normal, the local readings should be reduced by that amount in order to obtain the probable average between January 1 and May 1, 1905.

The " normal " referred to in several places above is the average of 381 density observations made at the *Fish Hawk* anchorages from January 1, 1905, to May 7, 1905, inclusive. The monthly averages are as follows: January, 1.0124; February, 1.0154; March, 1.0134; April, 1.0092, and May, 1.0100. The average daily observations are shown graphically in the upper curve on plate x, an inspection of which will show that the densities were sometimes fairly uniform for several days in succession, but frequently exhibited sudden and violent fluctuations. A study of these fluctuations shows that they are in large measure conditioned by the tides, and the latter are in turn, as has been previously stated, mainly influenced by the winds. A northeast wind, therefore, lowers the tide and decreases the density, while a southwest wind has the opposite influence. To illustrate this influence of the tides upon the density a tidal curve has been prepared showing the mean daily height of water at Matagorda above or below the plane of reference. It will be seen at once that there is a general coincidence of the two curves; whenever the tidal curve rises or falls abruptly there is a more or less synchronous rise or fall in the densities. The explanation is that whenever there is a low tide after a period of tidal elevation the current sets down the bay, carrying the fresh water discharged by the streams into the region below Dog Island Reef, whereas a high tide after a period of tidal depression backs the salt water from the gulf toward the head of the bay. Of course, these phenomena are related solely to what has taken place immediately prior to the time of observation and have no bearing upon more remote facts. For instance, the tides of the middle of April were higher than any of those of January and February, yet

Plate X.



DAILY DENSITY AND TIDE OBSERVATIONS IN MATAGORDA BAY BETWEEN JANUARY 1 AND MAY 7, 1905.

they were accompanied by much lower densities. It will be observed, however, that the tides, though higher than they were in February, were much lower than they were at the beginning of April, and that consequently the upper part of the bay was discharging the water which it held at the beginning of the month; in other words, the currents were setting from the fresher parts of the bay. Of course, in the long run the density is dependent upon the precipitation and drainage, and in April the streams were discharging into the bay a vastly greater volume of water than they carried in February. The greater the discharge of fresh water into the upper bay the lower will be the average density of the water during that time and for a longer or shorter period succeeding.

As a density of at least 1.0100 is generally regarded as essential to the production of oysters of good flavor it will be seen that, other things being equal, the region below Dog Island Reef has in respect to salinity an advantage over localities above the reef, and that between Dog Island and Mad Island reefs the southeast side of the bay is distinctly superior to the opposite shore and the middle. These facts are significant to the prospective oyster growers desirous of producing the best stock. The saltness of the oysters is less important to the shipper of shucked oysters than to the dealer in shell stock, as washing and icing, to which the former are subjected, tend in any case to deprive them of much of the original flavor. With the growth of the country in population and wealth, however, the shell trade invariably increases, a condition eventually to be expected on the Texas coast.

STORMS, FRESHETS, AND SILTING.

These factors are all concerned mainly with destructive action on the beds through the deposit of materials which stifle the oysters already existing and so cover the shells as to unfit them, for longer or shorter periods, for cultch.

The gulf is subject to the visitation of storms of great violence and destructiveness, which not only wreak great damage to the frailer works of man, but also cause marked changes in the topography and hydrography of the coast. Within the past thirty years two such gales, accompanied by extraordinarily high seas and tides, have been experienced in Matagorda Bay. During the great gale of 1875 the sea swept over the peninsula in many places, greatly changing the topography of that sandy strip of land and carrying large quantities of shore material into the neighboring portion of the bay. As has been before mentioned, Forked Bayou Reef was partially overwhelmed with sand at that time and nearly destroyed as a productive bed, and there is reason to believe that some of the other minor beds

have, either at this or some other not remote period, undergone similar experiences. If a bed raised high above the bottom, as is Forked Bayou Reef, can be thus threatened with extermination, planted beds, which will never be permitted to accumulate to any considerable depth, would be subjected to still greater danger. Fortunately, however, storms of such violence are uncommon, and an average period of considerable length is to be expected between successive occurrences. The chief danger to oyster beds lies in that part of the bay closest to the peninsula; the prairie shore and the middle of the bay are comparatively little affected. With this matter the sole consideration, the prospective oyster culturist should avoid a location in an exposed situation too close to the peninsula and especially the vicinity of very shifting sands either along shore or on the adjacent bottom.

There is another possibility of storm action, however, which may have a favorable aspect for the oyster industry. The same gale which practically covered Forked Bayou Reef cut a semipermanent communication between the gulf and upper bay, with the result, as has been before stated, of making favorable to oyster growth a great area of the bottom on which it had previously been inhibited by the freshness of the overlying water. The same thing is liable to happen again under similar conditions, but of course it can not be anticipated or taken into consideration in the location of oyster claims; and moreover, while benefiting the upper bay in general, the local conditions in the immediate vicinity of the cut, through scouring and erosion in one place and silting in another, would undoubtedly be more or less destructive.

So far as freshets are concerned, the peninsula shore, especially below Tiger Island, is practically immune. The drainage into that side of the bay is local and circumscribed and can never be considerable in amount. On the other hand, the streams discharging on the prairie shore drain thousands of square miles of land, over which at times there may be enormous precipitation. Freshets act destructively in two ways—by reducing, for considerable periods, the density of the water to a degree which the oysters are unable to tolerate, and by carrying upon the beds sand, mud, and débris, which bury the oysters, killing them and rendering their shells inaccessible to a new set. The first disaster is more liable to occur in that part of the bay above Dog Island Reef where the fresh water tends to become impounded or dammed back and where its effects extend more or less completely from shore to shore. The burial of beds under the deposits of detritus carried down by floods is, on the other hand, more likely to occur closer to the mouths of the streams, and the damage may be done in a comparatively short time. This agency of destruction is therefore more imminent close to the prairie shore, either above or below Dog Island, and we have a case in point,

already noted, in the destruction of Mad Island Reef by the débris carried upon it by the floods in the drainage basin of Mad Island Lake, which discharged close to the shoreward end of the reef. Localities such as this, therefore, are to be avoided for oyster culture.

The term "silting," though in general meaning the deposit of any materials, either coarse or fine, from turbid water, is in this special connection restricted to the more or less constant dribbling of fine material upon the bottom. It has but little effect upon adult oysters, operating mainly to cover the cultch, either natural or planted, with a deposit, very thin perhaps, yet sufficient to stifle the small fry at the time when it is settling to fix and become spat. This fine sediment is thrown down in general where the currents are slack, and will therefore, under present conditions, be greatest above Dog Island Reef and in the wake of the larger reefs in the lower bay—that is, on the prairie shore. In other words, the peninsula side of the bay below Tiger Island is liable to be more free from silt deposits, a fact of considerable importance to oyster growers in search of a location.

ENEMIES OF THE OYSTER.

The information gathered concerning the enemies of the oyster in Matagorda Bay is neither as definite nor as copious as it is to be desired. As the investigation was made entirely during the months of winter and early spring, direct observations upon this phase of the subject were comparatively few, excepting in the cases of mussels, boring clams, and similar organisms having no particular seasons of operation or presence. It is evident, however, that in common with other localities on the gulf coast Matagorda Bay is free, or practically free, from two of the most dangerous and troublesome enemies of the north Atlantic oyster beds—the starfish, which is the dread of the Long Island Sound oyster planter, and the drill, which annually causes great destruction on the Chesapeake. Besides the enemies enumerated below, it is probable that the large ray, known on the Louisiana coast as the "stone-cracker," may cause occasional damage, and there is also probable the occurrence of an obscure parasitic worm (*Bucephalus haimeanus*), which has been found in Louisiana.

Drumfish.—Of the aggressive enemies of the oyster this is apparently the most destructive found in the waters of Matagorda Bay. The species generally known as the "black drum" (*Pogonias cromis*) is found on the oyster beds more or less along the entire coast from New Jersey to the Rio Grande, but it varies much in destructiveness from year to year and with the locality. A low density of water tends to exclude some oyster enemies, such as the starfish, and a high density others, such as the drill (*Urosalpinx*), but the drum-

fish is found in water of almost any density, and no locality accessible from the sea may be expected to be free from it. Often within a single night, for this destroyer works chiefly in the dark, hundreds of bushels of stock are ground to fragments. The fish frequently congregate in considerable schools, and from 100 to 200 are known to have been killed by the simultaneous explosion of two charges of dynamite 50 feet apart. As the fish are large and powerful the damage wrought by a school so numerous as this would indicate can be readily appreciated. In the case of one grower near Tuckerton, N. J., about 80 per cent of a total planting of 15,000 to 20,000 bushels is estimated to have been destroyed in a few weeks, and such is the concealment which the nocturnal feeding habits of the fish afford that the damage was almost completed before the owner was thoroughly aware of what was occurring. The drum was, moreover, a comparatively new enemy in the vicinity, and even after the loss was noticed it was for some time attributed to theft.

This fish differs from most other animals preying upon the oyster in the fact that it is in general more destructive upon the planted than upon the natural beds, and the better the shape of the oyster the more liable it is to attack. The drum feeds upon its prey by grinding it up, shell and flesh, by means of the great molar teeth which floor and roof its mouth. The ill-shaped, densely clustered, sharp-edged raccoon oysters, the extreme of their type, are usually in such large clusters and present so many knife-like points and edges that it is difficult for the drum to crush them without itself suffering serious injury, and it is no uncommon thing to find the fish in the vicinity of raccoon oyster beds with badly lacerated lips and mouth. The planted oysters, however, especially those of the better grade, are in smaller clusters, and their rounded shells can be seized by the fish with much greater impunity. On the Louisiana coast, and presumably in Texas, unculled oysters can be bedded with comparative safety, but when the clusters are broken up in order to permit the liberated individuals to grow and improve untrammeled by their fellows it is necessary to surround them with stockades or netting to prevent their complete destruction by the drums. As might be supposed also the younger and thinner-shelled oysters are more likely to be damaged than large heavy-shelled ones, and it is generally observed that the period of a few weeks following planting is that of greatest danger. Whether the oysters in time become more or less concealed and inconspicuous through the deposit of silt, or from some other reason, it is generally observed that the old bedded stock is liable to escape while adjacent recently bedded oysters are destroyed.

In the winter the drumfish is less active and less abundant in shoal water, and for this reason the survey party had little opportunity to study it in Matagorda Bay. During some of the extreme

cold weather a number of dead drums were observed near Mad Island and at other places. The oystermen state that at times considerable damage is done at Half Moon Reef and on other beds in the lower part of the bay, but apparently there is less danger to apprehend above Dog Island Reef, though there is no reason why the fish should not be found there at times.

Mussels.—The mussel may be regarded as one of the passive enemies of the oyster—that is, an organism which injures it not by direct attack, but by appropriating to itself certain things which the oyster requires, in this case food and space in which to grow. As will be shown in a following section of this report, the oyster feeds mainly upon microscopic plants called diatoms, of which there is a more or less limited supply in any given body of water. Investigation has shown that the food of the mussel consists of these same organisms, and its consumption of food consequently lessens by so much the supply available for the oyster. An abundant growth of mussels therefore may render inadequate for the oyster a natural fertility of the water otherwise quite sufficient, and beds which if clear of mussels would produce oysters of good quality are thereby rendered of but little economic value. Moreover, if crowded by its fellows or by foreign growths, the oyster assumes elongated or irregular shapes, the shells are shallow, and the meat is generally inferior; in other words, it tends toward the raccoon type. The young mussels under favorable conditions attach in large numbers to the oysters, and as they grow with great rapidity they soon form dense masses, which fill all available space in the clusters and crowd the oysters to the point of starvation and suffocation. In a number of places in Matagorda Bay numerous instances were noted in which the mussels had grown in great masses over the lips of large oysters and had actually killed them.

In addition to the damage wrought thus, the mussels operate in other ways to injure the beds. By presenting entanglements they tend to collect seaweeds and other débris, which serve to stifle the oysters; and they very much interfere with culling, because, unlike oysters, they can not be knocked from the clusters, but, owing to their tough attachments, must be laboriously pulled off, leaving rough, unclean-looking débris behind.

In Matagorda Bay mussels are found in varying numbers on practically all of the oyster beds, but below Dog Island do not constitute a markedly objectionable feature. They thrive best in water of low salinity, and in the extreme upper part of the bay they constitute a serious menace to many of the beds. It was stated by persons familiar with the region that they have developed to this extent only within a comparatively recent period, mostly since the permanent

closure of Mitchells Cut. The oyster grower must take this fact into consideration, for beds overrun with mussels are not only less productive, but the stock is liable to be inferior in condition and external appearance and more labor is required to cull it.

Borer, boring clam (*Martesia cuneiformis*).—During the survey frequent reference was heard to the presence of borers upon certain of the beds, but investigation developed that it was neither the drill (*Urosalpinx*) of the Chesapeake nor the like-named snail (*Purpura*) of the gulf coast which was so designated, but a comparatively harmless little clam. Neither upon the reefs nor among the specimens exhibited by the oystermen was there found a single shell exhibiting the work of a predatory snail. A few live specimens of *Urosalpinx* were found, and on Half Moon Reef there were many egg cases of *Purpura*, but it is evident that these organisms are not destructive in these waters.

The boring clam appears to be confined almost exclusively to Half Moon and Mad Island reefs, being most abundant on the former, where a large proportion of the shells are occupied by it. It in no way preys upon the oyster, but merely utilizes the shell as a place of abode and does but comparatively little harm. If either living or dead oyster shells from Half Moon Reef are carefully examined, a very large proportion of them will be found to exhibit numerous small round holes, each fringed with a very short parchmentlike tube. If the shell be carefully broken, each of these orifices will be found to communicate with an egg-shaped cavity, narrow toward the opening and broader toward the inner face of the shell, in which is snugly lodged a little clam of corresponding shape. Often the chambers are so numerous as to be almost in contact and the shell is reduced to the structure of a honeycomb. In such cases it becomes much weakened, the outer layer scales off, the clam drops out, and the new surface exposed presents the bottoms of the chambers as a mosaic of smooth hemispherical pits having the appearance of drilled cavities almost penetrating to the inner face. It is this appearance that generally attracts the attention of the oystermen, who apparently do not connect it with the small inconspicuous orifices primarily existing.

The boring clam first enters the shell when quite small and increases the dimensions of its chamber as it grows, eventually attaining a length of three-eighths of an inch. The boring of the chamber sometimes perforates the shell, in which case the oyster throws down new deposits of shelly matter to close the opening and produces either a general thickening when the perforations are numerous and close together or a series of slightly elevated lumps when they are more isolated. The clam never attacks the oyster, but gets its food

through the external pores. Although so far as the writer is aware no investigations have been made, it undoubtedly feeds upon many of the same organisms that constitute the oyster's food, but so small must be the quantity required that it can not have much effect in depriving the oyster. The only real damage done by this organism is the gradual disintegration of the old shells to the lessening of their value as cultch and the occasional weakening of the shells of living oysters so that they break in culling.

Boring sponge (*Cliona sulphurea*).—This animal, like the preceding, attacks the shell rather than the oyster itself. It apparently is not so troublesome in Matagorda Bay as on some other portions of the coast, but evidence of its work was found on certain of the reefs below Dog Island; above that place the water is generally too fresh for it to grow in profusion. It produces what are generally known to the oystermen as "worm-eaten" shells, a condition characterized by a network of small irregular burrows which often so completely fill the shell and leave so little solid material that it can be crumbled in the fingers. In its young stage the sponge fills these galleries with a yellow pulpy mass and projects from the external orifices in little mushroom-shaped papilli or pimples. In its older stage it forms a large sulphur yellow or pale orange mass which may completely embrace the shell in which it originally grew. The means by which it burrows has not been definitely determined, but it probably exudes a fluid having a solvent action on the limy material of the shell.

The boring sponge damages the reefs in several ways. It breaks up the shells and covers them with a slimy deposit, both of which processes tend to unfit them for the attachment of future growths of oysters. It renders the shells fragile and difficult to cull, besides making the oysters unattractive as shell stock, both on account of their exterior appearance and the mottled and discolored aspect of their interior. It serves to encourage the accumulation of other débris on the beds. And, finally, as the galleries frequently penetrate the inner face of the shell, the oyster to stop the gaps is forced to lay down successive deposits of shell and apparently suffers more or less damage, for almost invariably badly infested individuals are poor in quality.

Barnacles (*Balanus*).—Barnacles are generally a minor or insignificant enemy to the oyster. Their effect is very much the same as that produced by the mussel, their rapid growth tending to produce crowding in the oyster clusters, besides making the shells unattractive and uncomfortable to handle. In Matagorda Bay they are not especially troublesome, though found in small numbers on a considerable number of the beds.

"*Red grass.*"—The growth locally known by this name is not a

vegetable substance at all, but consists of the closely aggregated egg cases of a snail-like mollusk, *Purpura*. It is found in dense masses upon the oysters and shells of Half Moon Reef, the growth being about one-half inch long, extremely tough and leathery, and of a rich crimson color. It is objectionable in itself as interfering with culling, and the mollusk to which the eggs give rise is reputed to drill the oysters, although the author has never been able to satisfy himself absolutely of the truth of this assertion.

FOOD OF THE OYSTER.

CHARACTER OF FOOD AND MANNER OF FEEDING.

The food of the oyster consists mainly of microscopic plants, principally of the kind known as diatoms, together with a small number of microscopic animal organisms, Infusoria, some of which so closely resemble plants that their exact status is still a matter of dispute among naturalists. Diatoms, a number of species of which are illustrated (pls. XI, XII, and XIII), vary greatly in shape and size, but all resemble one another in the interesting character of encasement in a siliceous or glassy shell, usually beautifully sculptured, and nearly all of them have the power of independent movement. Most of them exhibit a golden brown coloration, unequally distributed, but there are a few blue-green species. *Prorocentrum*, one of the so-called animal organisms referred to above, is an equally minute green body, propelling itself by means of a taillike lash, and it, too, is sometimes inclosed in a capsule, which, however, is not siliceous in structure. Though both diatoms and Infusoria are capable of motion by their own powers, their movements are too feeble to transport them any considerable distance and are only sufficient to raise them above the bottom, where, however, the organisms are brought within the action of tidal currents, which become the chief agency of transportation and bring about their general distribution.

The oyster feeds upon these minute bodies by straining them through its sievelike gills from the same water which it utilizes in respiration, and it passes them on to the mouth through feeble currents set up by the lashing of innumerable microscopic bristles which clothe the gills and the neighboring organs. These currents are the only means by which the oyster can reach out into the water surrounding it and bring to itself the food there supplied, and so weak are they and so limited in their radius of action that the supply available to each individual oyster would be soon exhausted were it not constantly replenished by tidal currents bringing new bodies of food-laden water within reach. In still water, therefore, the oyster is able to obtain less food than in flowing water of the same fertility.

DISTRIBUTION AND AVAILABILITY OF FOOD.

In any given body of water in which the physical conditions of precipitation, density, temperature, etc., are fairly constant there is a more or less fixed limit to the amount of oyster food produced, very much as there is limitation to the size of the crop that can under similarly fixed conditions be grown on a given area of land. As, however, the diatoms and other organisms upon which the oyster feeds are not permanently fixed to the bottom but suspended in the water, it follows that their abundance fluctuates rather more than that of land crops in general correspondence to the relative instability of the water as compared with the soil. A high storm tide, for instance, may carry away on its ebb large numbers of diatoms and materially reduce the food value of the waters over the oyster beds. Such phenomena are readily intelligible. There are others, however, connected with the distribution and abundance of diatoms, which are obscure as to their causes. It is a fact well known to students of diatoms that not only their abundance in a given body of water but the species themselves vary from year to year, and practical investigators of the oyster beds observe the same fluctuations. In an experimental pond or claire at Lynnhaven, Va., where every effort has been made to maintain practically uniform conditions, the rise and fall of many species has been observed and it was not possible to assign any cause for the changes. Oystermen and oyster growers have indirectly remarked the same fluctuations, as their oysters one year fatten and the next fail absolutely to get into condition for the market, a phenomenon found everywhere on our coasts, but more frequently occurring in some localities than in others.

Undoubtedly there are for these irregularities physical and chemical causes which it may take years to elucidate, but for the failure of the oysters to fatten in some localities there are sometimes causes which it is by no means difficult to trace. Like land plants, diatoms require for their growth certain soluble mineral salts, sunlight, and air, all of which they obtain in the water, the medium in which they live. The mineral salts, which the land plant obtains through its roots, bathe the diatoms on all sides, the water deriving them by solution of the materials of the bottom and from the leaching of the soils of the drainage basins of the tributary streams. The former source of supply must be fairly uniform year after year, and the latter, being dependent upon the precipitation, would appear, on the whole, to conform to an average within certain limits, being less in dry years and greater in wet ones, especially when freshets occur. In any given body of water, therefore, with a fairly constant supply of salts in solution there is a certain more or less definite limit beyond which the production of diatoms can not proceed for lack of necessary nutriment. To produce oysters of good size and quality a certain mini-

mum consumption of diatoms is necessary, with the exact definition of which we are not now concerned, and it follows from the limitation of the production of diatoms that the production of oysters in any given area is likewise limited. The absurdity of the claim of those enthusiasts who multiply the area of the tidal bottoms of a state by the annual yield of a few favorably situated acres and exhibit the product as the potential oyster production under a system of oyster culture is not difficult of demonstration. Every oysterman knows that on densely inhabited beds the oysters are less likely to fatten than on those beds where the growth is more scattering, and every oyster planter learns sooner or later, either from his own experience or the experience of others, that he will get unsatisfactory results if the density of his beds exceeds a more or less well-defined maximum; that though the oysters will grow, they will forever remain poor and unfit to market. In many cases the difficulty is attributed to its true cause, the multiplicity of mouths to feed from a limited larder.

There is, however, another condition which not infrequently escapes observation—the possibility of overplanting as to area, while maintaining but a moderate average density of growth. Instances are known where the only reasonable explanation of the facts appears to rest on the assumption that this has been done. In Lynnhaven Bay, Virginia, oysters formerly fattened every year without fail, but the profits of the business were so attractive that eventually a large part of the available bottom was taken up by oyster growers, and coincidently there was a gradual falling off in the condition of the oysters in many parts of the bay. With a decrease in the profits attendant upon the inferior condition of the oysters the quantity planted has recently decreased, and on certain areas they were, in January, 1906, fat for the first time in ten years. The oysters are planted more thinly at Lynnhaven than on any other part of our coast, the average being not more than about 100 to 150 bushels per acre; yet by utilizing an undue proportion of the bottom their aggregate demand for food has evidently become too great to be sustained by the natural fertility of the water. That this condition may be repeated in other places there can be no doubt.

Unfortunately our knowledge of the food and feeding of the oyster has by no means reached a stage where just what population a given body of water will sustain can be foretold. That determination must for many years at least be made a matter of experiment, but knowledge of the facts above stated may guard prospective oyster growers against a too rash and unconsidered expansion of their business and dictate care not only against planting too thickly, but against a too gregarious location of their claims. A general knowledge of the local distribution of food organisms in any given region is of value, and quite within reach. The survey is able to make some contribution to the subject.

FOOD VALUE OF WATER IN MATAGORDA BAY.

Determinations of the food value of the water in Matagorda Bay were made at all places where the density was recorded, about 120 stations, distributed at approximately uniform intervals throughout the bay, and many additional determinations were made at the anchorage of the *Fish Hawk* and upon the principal reefs. Explanation of the methods adopted in this work, though useful for the information of future investigators making comparative studies of the food of oysters in various parts of the coast, is of little general interest to the oystermen, and a discussion of them will be postponed to the end of this chapter. The subject of immediate practical value is the general distribution of the food, with the localities in which it is most abundant, and in the following tables will be found a digest of the results obtained by the present investigation.

The table on page 72 shows the stomach contents of oysters from five of the principal reefs, with the food value of the water from which these oysters were taken. The first column of figures represents (in heavy type) the average number of each organism found in the oyster stomachs and (in roman type) its corresponding food value. In the adjoining column are exhibited the number and food value of the same organisms found in a liter ($2\frac{1}{4}$ pints) of the water lying over and about the same reefs. It will be seen that the average oyster examined contains in its stomach about the same quantity of food as is found in a pint of water.

The table on page 73 is a systematic presentation of the kinds and numbers of organisms and their value as oyster food in the several parts of the bay above Half Moon Light. For purposes of comparison and discussion the bay has been divided into twelve sections running transversely to the shore, and for each there is shown the average food value of each species of diatom, the average of the section as a whole, and the average of each shore and the middle of the bay. The attention of the practical oyster grower is called to the totals rather than to the relative value of the individual species, as consideration of the details is reserved for the more technical discussion.

The food value, so called, represents the actual volume or bulk of the various species enumerated found in each liter of water taken at a level of 14 inches above the bottom, the unit of measurement employed being the one-millionth part of a cubic millimeter. A cubic millimeter is about six ten-thousandths of a cubic inch. In cases of organisms which from their small numbers or other causes are unimportant as food, the number only is shown, as it was considered unnecessary to calculate the volume.

STOMACH CONTENTS OF OYSTERS FROM PRINCIPAL REEFS OF MATAGORDA BAY AND FOOD CONSTITUENTS IN THE WATER.

[Roman figures indicate volume of organisms, or food value. **Bold-face figures** indicate number of organisms.]

No.	Species.	Tiger Island Channel. Oysters.	Tiger Island Channel. Water.	Dog Island Reef. Oysters.	Dog Island Reef. Water.	Forked Bayou Reef. Oysters.	Forked Bayou Reef. Water.	Shell Island Reef. Oysters.	Shell Island Reef. Water.	Mad Island Reef. Oysters.	Mad Island Reef. Water.
1	Coscinodiscus crassus	**100**		**75**			**375**	**150**	**300**	**101**	**1,312**
2	lineatus	126,875	350,000	101,045	126,000	66,500	196,875	71,375	231,000	62,860	295,295
		3,625	**10,000**	**2,887**	**3,600**	**1,900**	**5,625**	**2,125**	**6,600**	**1,796**	**8,437**
3	excentricus	11,250	12,000	7,728	12,300	600	9,000	5,100	14,400	6,360	19,128
		1,875	**2,000**	**1,288**	**2,050**	**100**	**1,500**	**850**	**2,400**	**1,060**	**3,188**
4	Navicula didyma	2,200		2,893	5,500	3,850	8,250	2,657	3,300	4,785	10,318
		200		**263**	**500**	**350**	**750**	**187**	**300**	**435**	**938**
5	elliptica	3,750		5,380	3,000	500		630		800	9,380
		375		**538**	**300**	**50**		**63**		**80**	**938**
6	arenaria	1,187	7,500	1,845	3,000	250	937		3,000	375	7,032
		475	**3,000**	**738**	**1,200**	**100**	**375**		**1,200**	**150**	**2,813**
7	Amphora ovalis	125		250	3,000	250			3,000	440	935
		25		**50**	**600**	**50**			**600**	**88**	**187**
8	Pleurosigma fasciola			393			2,531		2,700	60	418
				175			**1,125**		**1,200**	**27**	**186**
9	obscurum			250	1,500						9,370
				25	**150**						**937**
10	intermedium			325	11,250			1,250	7,500	2,000	32,825
				13	**450**			**50**	**300**	**80**	**1,313**
11	tenuissimum	**25**	**2,000**	**75**	**950**		**750**		**1,200**	**9**	**1,688**
12	angulata	1,125		1,125	6,750						
		25		**25**	**150**						
13	Synedra commutata	1,837	5,600	1,898	2,555	46,795	40,162	8,391	12,390	2,541	12,205
		2,625	**8,000**	**2,712**	**3,650**	**66,850**	**57,375**	**11,988**	**17,700**	**3,631**	**17,437**
14	sp	1,575		3,675	2,625	525	2,625		2,100	3,654	654
		450		**1,050**	**750**	**150**	**750**		**600**	**1,044**	**187**
15	Melosira distans	25,500	100,000	21,260	31,000	7,000	30,000	12,500	54,000	18,540	48,740
		1,275	**5,000**	**1,063**	**1,550**	**350**	**1,500**	**625**	**2,700**	**927**	**2,437**
16	sp	**75**		**87**		**350**					**375**
17	Pyxilla sp	**75**		**38**							
18	Other diatoms	**425**	**1,000**	**337**	**900**	**100**		**530**	**600**	**515**	**1,124**
19	Prorocentrum micans	8,400	28,000	16,181	2,800		2,625		4,200	4,571	2,625
		1,200	**4,000**	**2,312**	**400**		**375**		**600**	**653**	**375**
	Total volume, or food value	183,824	493,100	164,251	211,280	126,270	293,005	104,303	337,590	106,986	448,925
	Total number of organisms	**12,850**	**35,000**	**13,761**	**17,200**	**70,350**	**70,500**	**16,568**	**36,300**	**10,596**	**43,872**

FOOD VALUE OF WATERS OF MATAGORDA BAY.

[Roman figures indicate volume of organisms, or food value. **Bold-face figures** indicate number of organisms.]

No.	Species.	A. Between Sand and High Mound signals.	B. Between High Mound and Lake signals.	C. Between Mad Island West and Lake signals.	D. Between Shell Island and Mad Island reefs.	E. Between Dog Island and Shell Island reefs.	F. Between Dog Island and Pavilion signal.	G. Between Pavilion and Three-mile signals.	H. Between Three-mile and Seven-mile signals.	I. Between Seven-mile and Grass signals.	J. Between Grass and Dressing Point signals.	K. Live Oak Bay.	L. Above Dressing Point.
1	Coscinodiscus crassus	**500**	.....	**917**	**250**	**100**	**500**	**375**	**292**	**792**	**200**	.....	.....
2	lineatus	121,805	111,470	142,905	183,750	111,750	122,500	135,625	163,310	198,310	118,720	157,500	140,000
		3,483	**4,042**	**4,083**	**5,250**	**4,050**	**3,500**	**3,875**	**4,666**	**5,666**	**3,392**	**4,500**	**4,000**
3	excentricus	10,500	17,502	17,760	12,000	5,550	12,000	17,250	13,248	16,002	9,150	.....	3,498
		1,750	**2,917**	**2,960**	**2,000**	**925**	**2,000**	**2,875**	**2,208**	**2,667**	**1,525**	.....	**583**
4	Navicula didyma	4,125	6,413	9,625	11,000	.....	.....	.....	2,750	3,212	2,013	.....	4,587
		375	**583**	**875**	**1,000**	.....	.....	.....	**250**	**292**	**183**	.....	**417**
5	elliptica	1,250	1,660	4,160	2,500	1,000	5,000	2,500	4,170	12,500	.....	.....	2,500
		125	**166**	**416**	**250**	**100**	**500**	**250**	**417**	**1,250**	.....	.....	**250**
6	arenaria	937	1,145	1,688	3,750	250	1,250	3,438	730	1,458	2,500	3,750	5,420
		375	**458**	**675**	**1,500**	**100**	**500**	**1,375**	**292**	**583**	**1,000**	**1,500**	**2,167**
7	Amphora ovalis	2,500	.....	625	.....	500	.....	625	1,250	.....	830	3,750	1,665
		500	.....	**125**	.....	**100**	.....	**125**	**250**	.....	**166**	**750**	**333**
8	Pleurosigma fasciola	**250**	.....	**125**	.....	**425**	.....	.....	**166**	**166**	.....	.....	**166**
9	obscurum	.....	.....	**125**	.....	.....	.....	.....	.....	**125**	.....	**750**	**250**
10	intermedium	**125**	.....	.....	.....	**225**	**500**	.....	.....	**166**	**492**	.....	**583**
11	tenuissimum	**375**	**292**	**125**	**1,250**	**350**	**500**	**1,500**	**750**	**166**	**883**	**750**	**883**
12	angulata major	.....	.....	.....	.....	.....	**250**	**125**	**166**	**167**	.....	.....	.....
13	Synedra commutata	5,600	6,650	9,100	25,550	8,155	1,400	962	1,517	642	1,686	1,575	1,166
		8,000	**9,500**	**13,600**	**36,500**	**11,650**	**2,000**	**1,375**	**2,167**	**917**	**2,408**	**2,250**	**1,666**
14	sp	1,750	1,225	3,790	1,750	2,275	875	5,250	1,793	581	4,812	5,250	11,081
		500	**333**	**1,083**	**500**	**650**	**250**	**1,500**	**541**	**166**	**1,375**	**1,500**	**3,166**
15	Melosira distans	52,500	68,340	73,340	35,000	18,160	20,000	10,000	.....	20,000	13,500	.....	.....
		2,625	**3,417**	**3,667**	**1,750**	**908**	**1,000**	**500**	.....	**1,000**	**675**	.....	.....
16	sp	**250**	.....	**675**	.....	.....	.....	**250**	**542**	**167**	**208**	.....	**333**
17	Pyxilla sp	.....	.....	.....	.....	**200**	**250**	**250**	**167**	**125**	**100**	**750**	.....
18	Other diatoms	**1,250**	**500**	**292**	**250**	**300**	**1,000**	.....	**125**	.....	**517**	**2,250**	**500**
19	Prorocentrum micans	18,375	29,456	8,750	8,750	.....	3,500	2,625	5,832	7,875	14,581	5,250	11,669
		2,625	**4,208**	**1,250**	**1,250**	.....	**500**	**375**	**833**	**1,125**	**2,083**	**750**	**1,667**
	Total volume, or food value	219,342	273,861	271,743	284,050	177,640	166,525	178,275	194,600	260,580	167,792	177,075	181,586
	Total number of organisms	**23,108**	**26,416**	**30,393**	**51,750**	**20,083**	**13,250**	**14,750**	**13,832**	**15,540**	**15,207**	**15,750**	**16,964**
	Prairie shore	208,527	287,737	239,024	259,875	159,937	89,925	151,050	162,900	191,700	182,470	.....	.....
	Middle of bay	259,774	345,200	267,000	274,350	177,900	251,925	186,599	182,925	357,650	152,525	.....	.....
	Peninsula shore	190,049	188,450	314,412	317,625	193,770	153,725	189,675	238,349	232,250	168,674	.....	.....

It will be observed that while certain parts of the upper bay—notably the middle of section I—are prolific in oyster food, the general average is lower than below Dog Island, where the food value per liter (1¼ quarts) of water averages 251,327 units, as compared with 189,490 units above that reef, an excess of about 33 per cent.

In the lower bay the greatest fertility found anywhere during the survey was in Tiger Island Channel, where there were 493,100 units per liter, an extraordinary figure, due mainly to the abundance of one large diatom, *Coscinodiscus lineatus*, ordinarily found on or close to the bottom, its unusual abundance in the water specimens being doubtless due to its being lifted and carried by the strong currents. This locality would be a valuable one for oyster culture, but its use for private ends is prohibited by the fact that it is now and has been for a long time a natural bed. It is an interesting fact that the sections (E and F) immediately above and below this are practically less productive of oyster food than any in the bay, and so far as section E is concerned, it is the portions nearest Dog Island Reef and along the north shore which are most deficient, while on the south shore, near Forked Bayou Reef, it is especially rich, a quality reflected in the fatness of the oysters on that bed.

In sections C and D, lying between Lake signal and Shell Island Reef, the waters of the peninsula shore are more fertile than either the north shore or the middle, the food value being about 27 per cent greater than the former and 17 per cent greater than the latter. Farther down the bay, in sections A and B, the middle of the bay is most richly laden with food, exceeding the north side by about 29 per cent and the south side by not less than 60 per cent. The middle of the bay, in section B, about opposite Oyster signal, is the richest water above Half Moon Reef. Above Dog Island Reef the most fertile water lies generally in the middle of the bay, but with the exception of the middle of section I this belt is much inferior in food production to the best parts below Forked Bayou, the difference being about 17 per cent. The poorest water above Dog Island Reef lies, as might have been expected, close to the mouth of the Colorado, and the best is in the middle of section I, between Middle and Boggy lumps, where a really high degree of fertility is reached. The excellence of the food supply in this vicinity is reflected in the fatness of the oysters on Boggy Lump, a condition in which Middle Lump would undoubtedly participate were the growth there less badly clustered and musseled.

The method developed in this report of estimating the food value of waters is new, and there are no definite data for comparison; but it is the opinion of the writer, based upon general experience, that any water containing over 200,000 units of food organisms per liter may be regarded as good, while over 250,000 is very good. In any event there

is evidence to show that a food value of 250,000 units will in a moderate current produce fat oysters on a moderately dense bed, while 350,000 units will have a similar effect upon a very dense bed, like Boggy Lump, exposed to currents of less velocity. The production of oyster food in Matagorda Bay, therefore, can be considered on the whole very satisfactory, and sufficient to support a vastly greater oyster population than now exists. Taking into consideration not only the immediate abundance of diatoms, etc., but the size of the area over which they are distributed, the most favorable location for oyster planting, so far as available food is concerned, lies in the middle and on the peninsula side of the bay from just above Forked Bayou Reef to the extreme lower limit of the survey, a large extent of extremely productive water.

METHODS EMPLOYED IN DETERMINING FOOD VALUE OF WATER.

In the investigations of the oyster food of the waters of Matagorda Bay the methods pursued were as follows: The water specimens, one liter each, were taken by the survey party wherever density observations were made, at average intervals of about 1 mile, and, inclosed in tightly corked bottles, were carried back to headquarters at the end of the day and filtered. The filters are agate ware or copper funnels of 1 liter capacity, the small end being closed by a perforated cork, over which is stretched a piece of fine bolting cloth supporting a one-half inch stratum of well washed and sifted sand, fine enough to pass through no. 11 bolting cloth, but too coarse to go through no. 1. As the water in the funnels falls the walls are washed from time to time with filtered water from a wash bottle or a pipette, so that practically no diatoms or other organisms will adhere, and when the specimen has entirely filtered the walls are given a final rinsing, the cork is removed, and the sand washed with a small quantity of water into a vial or small beaker. The precipitate is then energetically shaken and the liquid immediately decanted off into a graduated vial, a small quantity of water is again added to the sand, and the process repeated. As the sand is much coarser and heavier, it at once settles, while the organisms are carried off by the successive washings and collected in the vial, sufficient water then being added, or abstracted after settling, to bring it to a standard measurement of 10 c. c. A few drops of formalin will preserve the organic contents of the precipitates, which are kept in vials appropriately labeled until such time as they can be examined. This method of filtration is more rapid than that of precipitation usually employed, and, moreover, the latter can be used only with difficulty on a rolling ship. Comparative tests show that they give approximately equivalent results. One cubic centimeter of the precipitate is then transferred to a Rafter cell and the diatoms in ten fields each 1 mm. square are iden-

tified and counted, a second specimen is examined in the same manner, and the sum of the twenty counts multiplied by 500 gives an approximate to the total number of diatoms of each species in the original liter of water. In former reports the writer has offered the total number of diatoms as an index of the food value of the water, but his experience in experimental work at Lynnhaven has shown this method to be subject to grave error even as applied to a limited region and to be very untrustworthy for purposes of comparison between different regions. As the species of diatoms vary widely in size and fluctuate in relative abundance, it often happens that a multitute of small ones give a fictitious value to a water specimen as compared with another specimen containing a much smaller number of a species of vastly greater volume. This is well illustrated in the table on page 73. Comparing the water of Tiger Island channel with that of Forked Bayou Reef, we find it to be but one-half as rich in individual diatoms; but its food value, as computed by the method hereafter explained, is found to be almost exactly one and two-thirds as great, a disparity produced by the comparative abundance in the former locality of *Coscinodiscus lineatus*, the largest diatom entering into the dietary of the oyster in Matagorda Bay, and in the latter place of *Synedra commutata*, the smallest species of importance. Grave[a] has recognized this and improves upon the previously employed method by disregarding in his report the smaller diatoms and tabulating the larger, more important ones by species. His results as published are interesting and valuable, but are difficult of comparison one with another and are still more difficult to bring into relation with results obtained by the same method in other regions producing diatoms of other species. Moreover, an error in the identification of the species, which may easily happen with persons not specialists in the group, would entirely vitiate the results for purposes of comparison by other workers. And finally, there is often wide diversity in the sizes of individuals of the same species, sometimes small and again large ones predominating.

In the present paper an attempt is made to estimate the actual volume of the oyster food in such manner as to make the results readily available for comparison. To this end each species was carefully measured in length and breadth and, wherever possible, in thickness. In some cases the latter dimension was calculated proportionately from published figures or estimated from the known thickness of a related species. From these measurements and the figure of the diatom its volume was calculated by ordinary methods, and this result was used as a multiplier in arriving at the results shown in the tables on pages 72 and 73. It is not contended that this method is absolutely accurate.

[a] Grave, Caswell. Investigations for the promotion of the oyster industry of North Carolina, Report U. S. Fish Commission 1903, p. 247–351.

but it gives good approximate values readily available for comparison with other investigations made by the same method and will in a measure place the study of oyster food upon a volumetric basis. It has the advantage also of placing less importance upon the absolute identification of the diatoms, for if the measurements be accurately made and the figures carefully drawn the volume can be calculated without reference to the exact names of the species.

The unit of measurement adopted in this report is that employed by Van Heurck in his Treatise on the Diatomaceæ, the one-hundredth part of 1 millimeter (0.01 mm.=0.0003937 inch), referred to as a "c. d. m." (centième decimeter). The unit of volume, which is regarded as presumably the unit of food value, is of course the cube of this, or one-millionth of 1 cubic millimeter (0.000001 c. mm.). It follows from this that when, as in section A of the table on page 73, the food value of the water is said to be 219,342, it is meant that in absolute measurement 1 liter of water contains diatoms of an aggregate volume of about one-fourth of 1 cubic millimeter.

In order to make the results of greater value for comparison and to render them susceptible to recasting to accord with such improvements as may be introduced into the method above outlined, there should be given for each species, or at least for all of the important ones, the following data: Name, or the name of closely allied species; outline of its figure; average length, breadth, and thickness, preferably in c. d. m.; its calculated volume; the number per liter of water, as determined by the Rafter method. Ordinarily it will be unnecessary to furnish these facts for all of the species, as it will be found that in any region from 4 to 8 organisms constitute the great preponderance of oyster food and the other species found are negligible for all practical purposes. In Matagorda Bay there were found in the stomachs of oysters about 25 species of diatoms and 1 infusorian, but over 98 per cent of the food in bulk was contributed by 8 organisms, *Coscinodiscus lineatus*, *C. excentricus*, *Navicula didyma*, *N. elliptica*, *Synedra commutata*, *Synedra* sp., *Melosira distans*, and *Prorocentrum micans*. The figure and the actual numbers of each species in each locality will be found in the accompanying tables and illustrative plates, and all the other data in the following notes on the several species. The identifications were verified by Dr. Alfred Mann, and with one or two minor exceptions are authoritative. The measurements given are the average dimensions of a number of individuals of each species.

DESCRIPTION OF ORGANISMS CONSTITUTING FOOD OF OYSTERS IN MATAGORDA BAY.

Coscinodiscus lineatus Ehrenberg (pl. XII, figs. 1–3) is a large circular diatom, which on account of its bulk and general distribution

is the most important food organism of the bay. It is found in practically equal profusion both above and below Dog Island, and an examination of the stomach contents of the oysters from the principal reefs shows that it constitutes about 63 per cent of the food. It lives on or near the bottom, and is suspended in the water most abundantly in the presence of strong currents or energetic wave action. Average specimens measure in diameter 5 c. d. m., thickness 1.75 c. d. m., volume=0.78 $(d^2 \times t)$=35 cu. c. d. m.

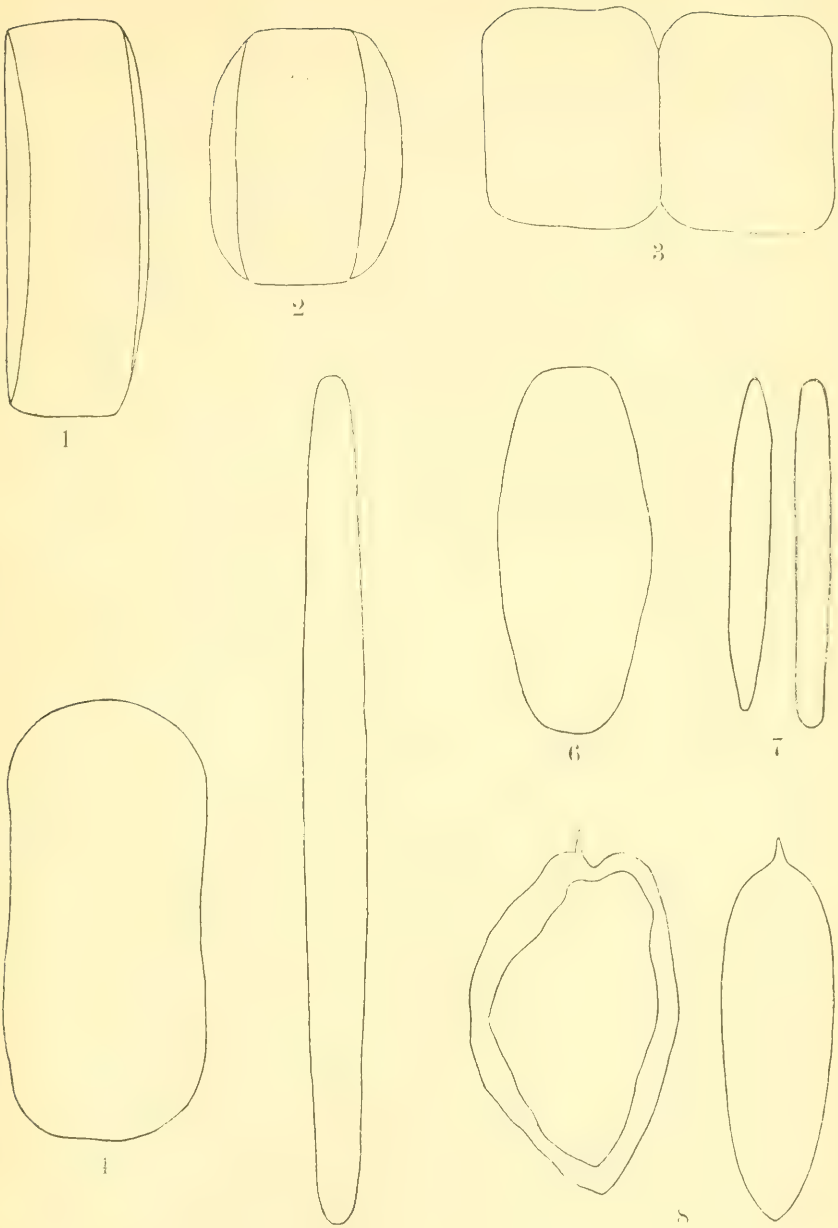
Coscinodiscus excentricus Ehrenberg (pl. XII, figs. 4–7) is a small circular diatom practically uniformly distributed, excepting in Live Oak Bay and the waters above Dressing Point, where it is deficient. In its vertical distribution it resembles the preceding species, and its numerical abundance is about one-half. Proportionally to its abundance in the water it is consumed in larger numbers, but owing to its smaller bulk it constitutes but about 10 per cent of the food found in the oysters' stomachs. Measurements of average specimens show the diameter 2.25 c. d. m., thickness 1.7 c. d. m., volume=0.7 $(d^2 \times t)$=6 cu. c. d. m.

Navicula didyma Ehrenberg (pl. XIII, figs. 7–11) is an 8-shaped diatom, found in much smaller numbers than either of the foregoing and not so universally distributed. It was altogether lacking in four sections, and is considerably more abundant and constant below than above Dog Island Reef. It constitutes about 1.8 per cent of the food of the oysters in the lower part of the bay. Average specimens measure in length 4 c. d. m., breadth 2.25 c. d. m., thickness 1.8 c. d. m., volume=0.7 $(l \times b \times t)$=11 cu. c. d. m.

Synedra commutata Grunow (pl. XI, fig. 7) is a very small and active boat-shaped diatom which is important by reason of its extraordinary abundance in the lower bay, especially in the vicinity of Forked Bayou Reef, where numerically it constitutes over 80 per cent of the total diatom content of the water. It was found in every section and at almost every station, but varies sharply in its numbers on the two sides of Dog Island Reef, the average per liter in section E being 11,650, and in section F but 2,000, while the average in the lower bay is over six times that of the upper bay sections. It furnishes in bulk about 9 per cent of the food of all oysters in the lower bay, though on Forked Bayou Reef this average rises to upward of 30 per cent. Average specimens are in length 4.7 c. d. ms., breadth 0.5 c. d. m., thickness 0.5 c. d. m., volume=0.6 $(l \times b \times t)$=0.7 cu. c. d. m.

Synedra species? (pl. XI, fig. 5) is an active diatom much longer than the preceding species. It is universally distributed, but is more abundant in the less saline waters near the mouth of the Colorado and the extreme upper parts of the bay, especially in the vicinity of Dressing Point and above. In the latter locality it constitutes nu-

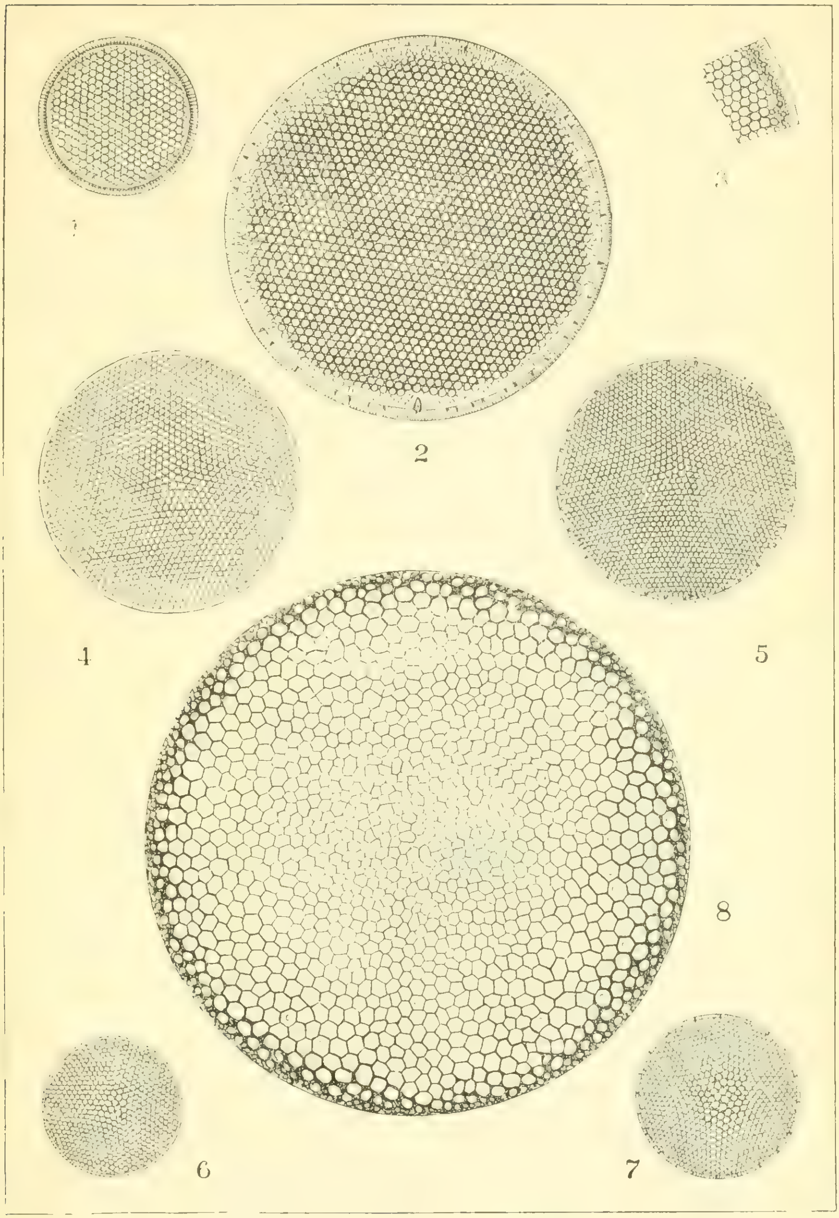
PLATE XI.



OUTLINES OF ORGANISMS CONSTITUTING FOOD OF MATAGORDA BAY OYSTERS

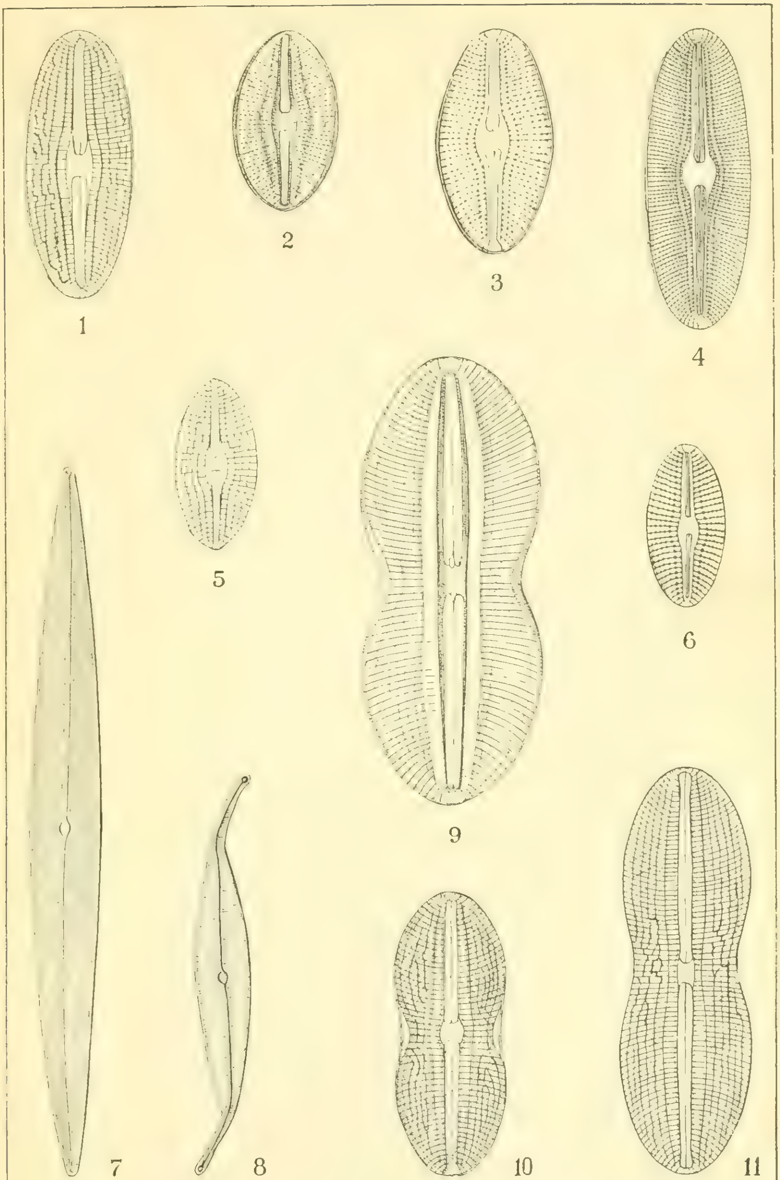
Magnification 1,000.

1. *Coscinodiscus lineatus.*
2. *Coscinodiscus excentricus.*
3. *Melosira distans.*
4. *Navicula didyma.*
5. *Synedra* sp.
6. *Navicula elliptica.*
7. *Synedra commutata.*
8. *Prorocentrum micans.*



ORGANISMS CONSTITUTING FOOD OF MATAGORDA BAY OYSTERS. (AFTER SCHMIDT.)
Magnification 440

1–3. *Coscinodiscus lineatus.* 4–7. *Coscinodicus excentricus.* 8. *Coscinodiscus crassus.*



ORGANISMS CONSTITUTING FOOD OF MATAGORDA BAY OYSTERS.

1–6. Navicula elliptica, × 660. (After Schmidt).
8. Pleurosigma fasciola, × 400. (After Smith.)
7. Pleurosigma intermedium, × 400. (After Smith.)
9–11. Navicula didyma, × 660 (After Schmidt.)

merically about one-fifth, and in volume about one-eighth of the available oyster food. Like the preceding species, it is taken up by the oysters in relatively large numbers, and constitutes about 3.4 per cent of their food. Average specimens measure in length 10 c. d. m., breadth 0.75 c. d. m., thickness 0.75 c. d. m., volume=0.65 (l×b×t)= 3.5 cu. c. d. m.

Melosira distans Kützing (pl. XI. fig. 3) is a circular diatom frequently aggregated by the circular faces to form filaments. It is much more abundant below Dog Island. and is entirely absent in Live Oak Bay and above Dressing Point. Between Mad Island and Half Moon reefs it comprises numerically about 12 per cent, and in volume over 25 per cent of the food contents of the water. It is taken up by the oysters in about the same proportion relatively to its abundance as *C. lineatus*, and in the lower bay constitutes about 12.3 per cent in volume of the stomach contents. Average specimens measure about 3.3 c. d. m. in diameter and 2.3 c. d. m. in thickness, volume=0.78 (d^2×t)=20 cu. c. d. m.

Prorocentrum micans Ehrenberg (pl. XI. fig. 8). an infusorian, is the last food organism of consequence and was found practically everywhere in the bay. It was apparently lacking in section E, but was in abundance on Dog Island Reef. It was about twice as abundant in the lower bay as above this reef. It is less abundant numerically than *M. distans*, and owing to its smaller size much less important in quantity, but it is taken up by the oysters in such large proportions that it constitutes about 4.3 per cent of their total food contents. Average specimens measure in length 4.5 c. d. m., breadth 2.75 c. d. m., thickness 1.4 c. d. m., volume=0.42 (l×b×t)=7 cu. c. d. m.

The other species of diatoms, constituting less than 7 per cent of the oyster food, are as follows:

Coscinodiscus crassus Bailey (pl. XII, fig. 8).

Navicula elliptica Kützing (pl. XIII, figs. 1–6), length 4 c. d. m., breadth 2.5 c. d. m., thickness 1.7 c. d. m., volume=0.6 (l×b×t)=10 cubic c. d. m.

N. arenaria Donkin, length 4.5 c. d. m., breadth 0.75 c. d. m., thickness 1 c. d. m., volume=0.65 (l×b×t)=2½ cubic c. d. m.

Amphora ovalis Kützing, length 5 c. d. m., breadth 2.5 c. d. m., thickness 1 c. d. m., volume=0.4 (l×b×t)=5 cubic c. d. m.

Pleurosigma fasciola W. Smith (pl. XIII, fig. 8), length 10 c. d. m., breadth 1.25 c. d. m., thickness 0.5 c. d. m., volume=0.35 (l×b×t)= 2¼ cubic c. d. m.

P. obscurum W. Smith, length 11 c. d. m., breadth 1.25 c. d. m., thickness 1 c. d. m., volume=0.75 (l×b×t)=10 cubic c. d. m.

P. intermedium W. Smith (pl. XIII, fig. 7), length 19 c. d. m., breadth 2 c. d. m., thickness 1 c. d. m., volume=0.6 (l×b×t)=25 cubic c. d. m.

P. tenuissimum W. Smith, length 30 c. d. m., breadth 1.8 c. d. m., thickness 1.2 c. d. m., volume=0.75 (l×b×t).

P. angulata major W. Smith, length 20 c. d. m., breadth 3.5 c. d. m., thickness 1 c. d. m., volume=0.6 (l×b×t)=45 cubic c. d. m.

Melosira sp., *Pyxilla* sp., and five or six others of occasional occurrence.

In determining the actual food of the oysters, 10 specimens between 4 and 4½ inches in length were selected from each locality, the shells carefully opened, and the contents of the stomachs removed as completely as possible by means of a pipette. To the stomach contents of each lot sufficient water and formalin were added to raise the volume to 5 c. c. and the number of diatoms per oyster was computed by the Rafter method, before alluded to. The results for most of the principal reefs are exhibited in the table on page 72. For purposes of comparison there is shown in each case the number of diatoms per liter of surrounding water as determined by the average of all counts of water specimens taken on the bed and in its immediate vicinity. The water specimens on the reef were usually taken at the same time as the oysters, but owing to the exigencies of the work the specimens over the neighboring bottoms were sometimes taken several days before or after. This may explain some of the minor inconsistencies of the table.

It will be observed that all of the species found in the water enter more or less into the dietary of the oyster, but that of the commoner forms the smaller, more active organisms, like *Navicula didyma*, *Synedra commutata*, and *Prorocentrum*, are taken up in larger proportion than the larger, less motile species, like the *Coscinodisci* and *Melosira distans*. It would appear, too, that long spinous species like *Pleurosigma tenuissimum* would be practically valueless as food even were they more abundant, probably owing to their entanglement in the cilia of the gills, palps, etc., which would retard their movement toward the mouth.

The most astonishing development of the endeavor to make a volumetric estimate of the oyster's food was the small quantity found in the stomachs. Numerically the results accord fairly with the writer's previous experience and with the results obtained by other investigators, the methods being in general the same in all cases; but the volumetric results showed the average stomach content of all oysters examined to be about one-eighth cubic millimeter, less than one-tenth

the volume of the head of an ordinary pin. The method of extracting the food from the stomach is admittedly crude and inexact, and undoubtedly a considerable proportion of the stomach contents are not withdrawn, but even so the results show that the volume of food at any given time must be very much smaller than has heretofore been suspected. Basing the opinion upon the known rate of growth of oysters, and under the extreme assumption that the food is converted into oyster bulk for bulk, the rate of ingestion must be vastly more rapid than assumed by Grave or suspected by other investigators. An oyster whose body is 2½ inches long will, when in good condition, have a bulk of 12,000 to 15,000 c. mm. Assuming that the normal stomach content is one-fourth cubic millimeter, twice that indicated above, and adopting Grave's statement that this normal content is ingested in four hours, it would require from 800 to 1,000 days' constant feeding for the oyster to procure food in bulk equaling its own. We know that oysters on the gulf coast will grow to the volume mentioned in less than two years, sustaining the while all of the energy expenditures of metabolism and mechanical movement. The matter merits investigation and the revision of the assumptions of previous investigators, and the writer contemplates its consideration in the near future.

SPAWNING OF OYSTERS.

The spawning of oysters consists, in brief, of the discharge of eggs from the female and spermatozoa from the male to meet and fuse in the surrounding water. The fertilized eggs develop into minute embryos, each furnished with a little brush of cilia or hair-like processes which vibrate in rhythm and propel it feebly through the water. After a time varying with the temperature of the water the embryos develop a tiny shell, which by its weight eventually precipitates them to the bottom, where, if they fall upon a suitable clean, firm support, they attach and grow into spat, but if not they speedily die. As their own powers of locomotion are inconsiderable, the wide distribution of the young oysters in their swimming stage is dependent upon the currents.

Oysters in the spawning condition are of a peculiar creamy color, with branching lines traced over the surfaces of the body. When they are cut the ripe genital products at once exude from the wound, but if the shell be opened carefully and a gentle pressure exerted upon the body they will be discharged from a definite opening lying below the muscle (usually called by oystermen the "eye" or "heart") which extends between the two valves. This is the pore from which they flow in the normal process. Ripe oysters in the language of the oystermen are aptly described as "milky."

Spawning takes place, in the main, during spring and summer, in any given region extending over a period of some months, depending upon the latitude and the climate. On the gulf coast I have found during almost every month oysters which were apparently ripe, and from which there were obtained eggs which readily separated in the water and had every appearance of maturity. Whether such eggs would be extruded during the winter under natural conditions is doubtful, and if they were it is practically certain that they would not develop, as the experience of all investigators has shown that development is inhibited if the temperature of the water drops materially below 70°. In Matagorda Bay no ripe oysters were found before the early part of April and it was toward the end of that month before they occurred with any frequency. A reference to the tables of temperatures will show that this time was practically coincident with a maintained temperature of over 70°. The winter had been an unusually severe one and it is possible that in more normal seasons the conditions favorable to spawning occur earlier; but it may be assumed that a heavy discharge of spawn rarely if ever takes place much before May 1, and, judging from experience on other parts of the gulf coast having similar conditions, spawning is in all probability practically concluded by the first week in August. Such oysters as ripen at other times are abnormal and very much in the minority. It is said that sometimes in other places a heavy strike is obtained in September, but the writer has never observed this and believes that such statements are due to the fact that the spat is very minute at the time of fixation and is usually not noticed until several weeks after the actual strike has occurred.

SEED AND CULTCH.

Two general systems of oyster culture may be pursued in Matagorda Bay, either of which wisely followed would materially increase the productiveness of its waters. By one method young clustered oysters might be removed from the natural beds, where the competition among the individuals of the dense population is so keen as to be injurious to all, and planted more sparingly and separately on suitable bottom where a favorable environment would inevitably result in general improvement. The second method is practically to produce new beds by distributing over the barren bottoms shells or other materials to serve as spat collectors.

The first method, which may be appropriately distinguished as transplanting, is that which is usually followed in the incipiency of oyster culture in a given locality, and for a time, at least, if placed under proper restrictions, it serves a useful purpose. On many of the upper bay beds—Middle Lump, Raymond Shoals, etc.—there are vast numbers of young oysters which by very reason of their abun-

dance and consequent crowding are predestined to an early death, or, if they survive at the expense of their fellows, will never reach a condition fitting them for market. Those that live will, through partial starvation and lack of room to grow, be the same poor worthless things of which the adults now on the beds are types. The mortality on such beds is enormous and practically the entire product under present conditions is lost to commerce.

It has been amply demonstrated that such oysters, poor, small, and ill-shaped, have, if not too old, the potentiality of conversion into oysters of the first grade if placed under the proper conditions. It will not suffice to carry them in bulk, mixed with débris, and dump them en masse on the nearest available bottom, as has been done in some of the so-called planting heretofore attempted in Matagorda Bay. To do so merely perpetuates, in a degree somewhat ameliorated, perhaps, the unfavorable environment with which they have previously striven and the improvement obtained may be so slight as hardly to pay for the labor involved. To obtain a proper measure of success the oyster grower must produce better stock than can be obtained on the natural beds, for he has to pay not only for practically twice the labor which is expended in oystering on the reefs, but is, in addition, under expense for the rental of the bottom on which he plants. He must be in a position to supply fat oysters when those on the reefs are poor, and to produce at all times stock of better size and shape. Such stock involves less labor in shucking and "opens" a larger proportion of meats to the barrel, and the dealer finds it economy, therefore, to purchase it at a higher price than he could afford to pay for the more inferior wild oysters. To get such superior product the grower must proceed with care and intelligence commensurate with that which must be expended to succeed in any other calling. Oyster culture has everywhere received severe setbacks by reason of the glittering promises so frequently held forth by theorists that to make a fortune the only requisite is to plant at random and reap the harvest. Nature is bountiful—many an oyster grower has found too bountiful—but her concern is with the species and not with the individual, whereas the character of the individual is a matter of vital import to the grower, who will find it more profitable to have a fair quantity of good oysters than a host of indifferent ones that he can not sell, that are little or no better than the coon oysters of the crowded natural reefs.

The law in Texas makes excellent provision for the removal of seed oysters from overcrowded and unworkable reefs, and, as is shown in that section of this report dealing with the natural beds, there is an abundant supply from which to draw. In nearly all cases these oysters are in dense clusters, which, in order that growing and feeding space be provided for the individuals, should be

broken into singles and smaller clusters before being replanted. As the large clusters usually part readily, the amount of labor involved is not great and is amply repaid by the improved shape and condition of the resulting stock and the less time consumed in the final culling for market.

There is always some mortality involved in the transplanting of oysters, owing to injuries received in handling, the immersion of some of them in the mud, and the unfavorable positions into which some fall, especially when clustered, but the growth is usually so much more rapid than in their original environment that the bulk or volume of the planted stock rapidly increases. The gain to the planter comes both from an increase in quantity and, under proper conditions, an increased price due to superiority of quality. That the dealers will pay more for fat and well-shaped oysters is evidenced in Matagorda Bay by the fact that the schedule of prices is higher for oysters coming from certain beds or localities than for those from other places producing more irregular and more poorly nourished stock.

The second method of oyster culture referred to above, that of planting shells or other firm, clean material for the purpose of catching the spat, or young oysters, is that which operates most efficaciously to increase the oyster production of any given region. As is shown in the descriptions of the several natural beds of Matagorda Bay, probings have shown that all, or practically all, of them rest upon a substratum, more or less deeply buried in accord with the age of the reef, which differs in no essential particular from the bottom which surrounds them. It is evident that they all originated in the deposit on the soft bottom of the bay or along its shores of some firm body which, catching a few young oysters, served as a nucleus from which the future growth extended.

The egg of the oyster after discharge from the female meets in the water a minute body discharged from the male, and as the result of the fusion of the two there is produced a tiny embryo, very unlike an oyster, which is endowed with feeble powers of swimming. Currents catching up these little bodies carry them about until such time as a shell begins to form, when they are precipitated to the bottom by their rapidly increasing weight. Should they fall on soft mud they are speedily stifled; but if by happy chance they should lodge on a clean body, say an old oyster shell or a living oyster, they at once attach to it and begin to grow.

Under the conditions obtaining in Matagorda Bay, and in fact in all of the oyster regions of our coasts, the chances are vastly against any given oyster fry finding a suitable lodgment. An inspection of the accompanying chart will show approximately what these chances are, practically the only natural places of attachment being on the preexisting beds, and all spat settling down on the vastly greater

areas of soft mud being doomed to inevitable destruction. The loss of oyster life from this cause alone is beyond computation. Any salvage of these infant oysters means just so much added to the resources of the region, and nature herself has shown how it may be encompassed. Shells thrown upon the mud serve as the most ready agent. Large quantities of them are to be found at the oyster houses at Port Lavaca, Palacios, and Matagorda, and their value as they lie is slight. It is estimated that at Matagorda in 1905 there were 80,000 bushels of shells, enough to plant 200 to 400 acres of bottom, all accumulated within from one to three years. If these were planted and yielded but a moderate product, they would be more than sufficient to supply Matagorda with all the oysters required in her present trade. They would cover, with sufficient density for the best results, an area of barren bottom greater than the actually productive area of Dog Island Reef (including Tiger Island), and once established such beds could, with proper care, be maintained as self-perpetuating. At Palacios there is a smaller but still considerable quantity of shells, while at Port Lavaca, the center of the largest and oldest established oyster trade of the region, the shell heaps are very much more extensive. It is the confident belief of the writer that, judiciously planted, there are more than enough oyster shells on the shores of Matagorda Bay to double the present available supply of marketable oysters within two years, and that the product could be made to excel in shape and condition, and consequently in value, any now existing there.

It is not known to the writer that there are any other cultch materials available in the vicinity of Matagorda Bay, but it is not improbable that there are. Shells of clams and related mollusks, broken stone, bricks, gravel, bones, brush, and old tarred netting are all employed in one place or another on our coasts. Any clean firm body that will not become engulfed in the mud will serve the purpose. In Matagorda Bay, crushed stone and gravel would probably fail, as the particles are so small and the specific gravity so high that the cultch would become buried almost as soon as deposited, excepting on the small areas of fixed sand found in places near the peninsula shore.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.

The following is offered as a brief summary of the observations made by the survey and deductions therefrom.

1. The natural oyster beds of Matagorda Bay above Half Moon Reef embrace an area of about 3,108 acres and contain about 445,900 barrels of oysters over 3 inches in length. The oysters on the beds above Dog Island Reef were, at the time of the survey, practically valueless, except for steaming, owing to the freshness of the water.

Below and including Dog Island Reef the beds are generally in good or fair condition, excepting Half Moon Reef, which was nearly exhausted owing to overfishing and the lack of a set for several years preceding.

2. Taking into consideration the content of adults and the number of young oysters, it is estimated that the beds below and including Dog Island Reef can not sustain a demand of much over 125,000 barrels per annum for any considerable term of years, and not over 75,000 barrels per year ought to be taken from the beds above Dog Island should they become fit to work. It must be understood that this estimate is based on conditions at the time of the survey and that the yield may fluctuate from year to year, but it is believed that if much more than the estimated quantity be removed year after year the beds will be exhausted.

3. Owing to the settlement of the country and the improvement of shipping facilities, the demand for oysters in the Matagorda Bay region is increasing and at present is approaching closely the limit that may be regarded as a safe yield of the natural beds above Half Moon Reef.

4. The time has now come when to provide for the legitimate expansion of the oyster business it will be necessary to supplement the yield of the natural beds by a system of oyster culture under private ownership. To this end there is no strongly opposed public sentiment, and the laws, with one or two defects, are reasonably good and favorable.

5. The natural conditions of density, food, bottom, currents, etc., are favorable over an area of the bay sufficient vastly to increase the oyster product. Taking everything into consideration, the best locality is on the peninsula side of the bay, near the edge of the sand and outward between Snapper Rock and Crane signal, shown on the chart. The bottom here is of moderately firm texture, the currents flow with greater velocity than toward the prairie shore, the food supply is good, and the salinity is higher than on the north shore or above Dog Island Reef. On the firmer bottom seed oysters can be planted, while the softer mud will support shells distributed to catch the spat. It is believed that profitable beds can be established in this region, and to a less extent immediately above Tiger Island channel, but it will not suffice to employ the haphazard methods previously in vogue. If seed oysters are planted, they must be properly culled and freed from débris. The reader is referred for a fuller discussion of these matters to the preceding section of this report. A description of the methods to be employed will be found in a pamphlet entitled "Oysters and Methods of Oyster Culture," which can be obtained on application to the Bureau of Fisheries.

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DEPARTMENT OF COMMERCE AND LABOR
BUREAU OF FISHERIES
CHART
OF PART OF
MATAGORDA BAY
TEXAS
SHOWING LOCATION OF OYSTER BEDS
DEPTH AND SPECIFIC GRAVITY OF THE WATER
AND CHARACTER OF THE BOTTOM
FROM A SURVEY MADE UNDER THE DIRECTION OF
H. F. MOORE
DECEMBER 1904 TO MAY 1905
Explanation of Symbols
Oysters, very scattering, beds averaging per acre less than 25 bushels
Oysters, scattering, beds averaging per acre between 25 and 100
Oysters, dense, beds averaging per acre more than 100 bushels
Reefs and shell banks exposed during low winter tides
Date and figures in red indicate bottom density of water and date
Figures in black indicate depth in feet at mean low water in winter
Coast Survey triangulation stations used in the present survey
Triangulation stations established for the present survey
Abbreviations
S .... Sand
hrd M .... hard Mud
sft M .... soft Mud
Light House
Private Beds
Boggy Lump
Eleven Mile
Live Oak Bay
Shoals
Reefs